FIVE YEAR PROGRAM ASSESSMENT AND EVALUATION REVIEW (2006-2007)

Submitted to

Associate Vice Chancellor for Academic Affairs/Planning, Assessment and Research

By

Department of Industrial and Systems Engineering
College of Engineering
North Carolina A&T State University
Greensboro, NC 27411

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1. Overview of Department and Programs

The Department of Industrial and Systems Engineering contains programs leading to the Bachelor of Science, Master of Science, and Doctor of Philosophy degrees. Established in 1977, the Department of Industrial and Systems Engineering is the only Industrial Engineering program in the Piedmont Triad and one of two accredited programs in the state of North Carolina. The program was established 16 years before the formation of any other IE program at a Historically Black College or University. The Bachelor of Science in Industrial Engineering program has been accredited by the Accreditation Board for Engineering and Technology (ABET) since 1983. The department is a leading producer of African American industrial engineers. The Master of Science in Industrial Engineering program began in 1983. This program is a leading producer of African American industrial engineers at the Master's level. In 2000, the Doctor of Philosophy in Industrial Engineering program began and has seven graduates to date.

The faculty and staff who serve the department are provided in the following table:

Name	Title
Dr. Lauren Davis	Assistant Professor
Dr. Salil Desai	Assistant Professor
Mr. Joseph Hong	Adjunct Assistant Professor
Dr. Xiaochun Jiang	Assistant Professor
Dr. Daniel Mountjoy	Program Coordinator and Adjunct Associate Professor
Dr. Celestine Ntuen	Professor
Mr. Steve Oneyear	Adjunct Associate Professor
Dr. Eui Park	Professor
Dr. Xiuli Qu	Assistant Professor
Dr. Bala Ram	Professor
Dr. Funda Samanlioglu	Assistant Professor
Dr. Sanjiv Sarin	Professor and Associate Dean
Dr. Younho Seong	Assistant Professor
Dr. Paul Stanfield	Associate Professor and Chair
Dr. Silvanus Udoka	Associate Professor (joint appointment)
Ms. Elizabeth Brooks	Administrative Assistant
Ms. Elaine Vinson	Undergraduate Enrollment Coordinator
Mr. Demetrius Martin	Laboratory Manager

2. Department Strategic Plan for 2006-2007

2.1. Departmental Mission

The mission of the Industrial and Systems Engineering Department at North Carolina A&T State University is to provide educational experiences in an environment that allows students to have a sense of belonging and purpose. The educational experiences are designed to produce competent industrial engineers who will serve the business and government needs with their expertise in designing, improving and installing integrated systems of people, materials, information, equipment and energy.

2.2. Department Initiatives

Departmental initiatives are those efforts undertaken by the department beyond normal operational activities. Such initiatives might be considered special projects.

2.2.1. Primary Initiatives

Primary initiatives are those efforts that are expected to reach some form of maturity during the school year. For the 2006-7 school year, there are four primary initiatives:

- Development of student recruiting strategy, materials, and processes that maintains current undergraduate and graduate student enrollment while improving student quality.
- Successful preparation for the ABET accreditation visit with report due in Spring 2007 and visit in Fall 2007.
- Pursuit of larger scale, longer term research projects which integrate sub-disciplines and connect department to other disciplines.
- Significant improvement in the appearance, utilization, and effectiveness of student laboratory experiences.
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2.2.2. Secondary Initiatives

Secondary initiatives are those efforts that will begin in the current school year, but are expected to be completed in the subsequent school year.

- Explicit integration of the CAP skills (see Figure 2.1)
- Formalization of student interns to increase educational experience for student and assessability for department.

2.3. Departmental Strategy

Department strategy is divided into the following subcategories: undergraduate education, graduate education, shared resources, research, and departmental development. Strategies, goals/metrics, and actions are given for each area. Note, this departmental strategy was implemented in late Fall of 2006 and

2.3.1. Undergraduate Education

2.3.1.1. *Recruitment/Retention*

Strategy:

- Enhance undergraduate recruitment and retention through developing a profile of the successful ISE student, customize recruitment processes, and gain more detailed insight into the reasons students transfer into and out of the program.

Goals/Metrics:

- Correct number of students successfully recruited to maintain enrollment level
- Summary statistics (including profile data) of students leaving or transferring out of the program
- Increase in high school GPA and SAT scores of incoming freshmen

Actions:

- Create survey and database for student recruitment data.
- Collect profile data on freshmen and students leaving the program
- Be more explicit in showing/explaining paths to the program through transfer from community college programs.
- Develop course sequence diagram for student and faculty use.
- Determine and implement most effective undergraduate advising system (to enhance new registration form).

2.3.1.2. *Assessment*

Strategy:

- Utilize an assessment strategy that is sustainable, leads to program improvements, and creates a minimum of workload for faculty and staff.

Goals/Metrics:

- Successful completion of ABET self-study report
- Successful completion of departmental report for SACS accreditation

Actions:

- Stay on, or ahead of, COE timeline for ABET preparation items.
- Development and utilization of rubrics for common assessments across prescribed classes.
- Consolidate and track trends in data collected on INEN 289/389/489/500 assessment tests.
- All faculty contribute questions to the databank used for the 289/389/489/500 courses.
- Invest in technology to create and summarize departmental surveys in-house.

2.3.1.3. *Curriculum*

Strategy:

- Complete the connectivity of program outcomes to course learning objectives, and begin explicit integration of the “CAP and STILTs” skills into the curriculum.

Goals/Metrics:

- Number of improvements to program based upon assessment data
- At least two skills tracks associated with classes and CAP skills.

Actions:

- Resolve course sequencing issues.
- Document efforts to close the loop on all program outcomes.
- Focus on completion of course assessment matrix.

2.3.2. Graduate Education

2.3.2.1. *Recruitment*

Strategy:

- Maintaining the same number of graduate enrollment at 60 students in both MS and Ph.D. programs while recruiting higher caliber graduate students.

Goals/Metrics:

- 70% of newly admitted masters students have 3.0 GPA or higher.
- At least 50% of newly admitted Master's students from outside our BS program.
- Changing admission policy for the Ph.D. program by adding GRE requirements.

Actions:

- Publishing a new recruitment brochure for graduate programs.
- Visiting at least five universities/conferences for recruiting high caliber students.
- Sending recruiting letters to the GEM and NACME mailing lists.
- Conduct a review of admission policies.

2.3.2.2. *Curriculum*

Strategy:

- Reviewing and reevaluating the current graduate curriculum tracks and courses – including potential contraction and expansion.
- Improve quantitative and computational background of students.

Goals/Metrics:

- Report on reevaluation of the current graduate programs.
- Successful hire of new faculty in the area of Service Sector / Health Care Engineering

Actions:

- Holding special meetings for curriculum reevaluation
- Scheduling a special topic class on Health Care Engineering for the Fall semester of 2007

2.3.3. Shared Resources

2.3.3.1. Teaching

Strategy:

- Educate faculty and promote the use of methods for effective teaching, increased consistency, and faculty efficiency.

Goals/Metrics:

- Average teaching score for department higher than score for college
- Complete list of the College of Engineering available software
- Having customized textbooks available for manufacturing courses
- Scheduling team teaching course(s) for the Fall of 2007

Actions:

- Working with the College IT Committee to develop a complete list of available software
- Encouraging PSE faculty members to develop customized books for INEN 246, 324 and 446
- Encouraging faculty members to team up for teaching courses together

2.3.3.2. Laboratories

Strategy:

- Increase student learning and motivation through use of integrated, well-supported laboratory experiences and shared spaces.

Goals/Metrics:

- Use of five ALIVE modules in Spring 2007
- 30% of undergraduates have laboratory experience in Spring 2007
- Providing technical support for lab classes and research

Actions:

- Publishing laboratory manuals and holding training for faculty
- Working with the Dean for possible additional position for lab manager
- Establish improved system for recognizing faculty workload in laboratories
- Prepare plans and layouts for new Graham lab space
- Complete 5S and corporate look of ISE shared space.

2.3.4. Research

2.3.4.1. Publication

Strategy:

- Increase student participation and faculty interaction in the area of journal publication.

Metrics:

- Number of publications by faculty (goal – 10).
- Number of publications with multiple faculty involvement (goal – 4).
- Number of publications with student or former student coauthor (goal – 4).

Actions:

- Maintain up to date list of publications.
- Consider adding firm requirement to Ph.D. student research.

2.3.4.2. *Presentation*

Strategy:

- Increase student participation and faculty interaction in the area of conference presentations.

Metrics:

- Number of presentations by faculty (goal – 30).
- Number of publications with multiple faculty involvement (goal – 15).
- Number of publications with student or former student coauthor (goal – 15).

Actions:

- Maintain up to date list of presentations.
- Consider adding firm requirement to graduate student research.

2.3.4.3. *Funding*

Strategy:

- Seek longer term projects that encourage integration of tracks and connection to other disciplines.

Metrics:

- Number of research projects proposed over $250,000
- Number of research projects proposed across sub-disciplines
- Number of research projects proposed with other disciplines
- Annual research dollars for funded projects

Actions:

- Incorporate research project overview and proposal planning as part of faculty meetings.
- Find and solicit large scale proposals implied above.

2.3.5. Departmental Development

2.3.5.1. *Faculty*

Strategy:

- Provide opportunities for faculty to build individual teaching and research skills and collective teamwork. Emphasis is placed on opportunities for tenure track faculty.

Metrics:

- Number of activities undertaken (goal = 2 / faculty)
- Increase level of faculty satisfaction

Actions:

- Quarterly individual lunch with chair
- Create method to measure faculty satisfaction and make part of review process

2.3.5.2. *Staff*

Strategy:

- Provide opportunities for staff to build individual relevant skills individually and collectively

Metrics:

- Number of activities undertaken (goal = 2 / staff)
- Increase level of faculty satisfaction

Actions:

- Quarterly individual lunch with chair
- Create method to measure staff satisfaction and make part of review process

2.3.5.3. *Corporate/Alumni Relations*

Strategy:

- Organize processes and database for sustained connection to corporations and alumni.

Metrics:

- Tasks below complete
- Alumni donations exceeding $1,000
- Corporate donations exceeding $10,000

Actions:

- Complete alumni database update and communication.
- Complete corporate database including population.
- Create corporate connection information and communication with students.

2.3.5.4. *Student / Internships*

Strategy:

- Develop student leaders and organizations that exhibit professionalism required for practice.

Metrics:

- Student organization performance
- Number of students going for summer 2007 internships

Actions:

- Begin increased formalization of internship program.
- Create writing version of Toastmasters club.

Department of Industrial and Systems Engineering
Student Skills Strategy

To get in the game, you need a CAP!

The CAP is a symbol of graduation with your engineering degree. In order to receive that degree, you have to demonstrate skills that will be required of all engineers.

C Communication skills focus on the ability to speak, write, and listen- to a variety of audiences - concerning both technical and business matters. Mastery of these skills reveals your mastery of other skills listed below.

A Analytical skills involve the decomposition of a system into component parts and subsequent modeling of the system using quantitative, experimental, or computational tools. We view math and the computer as our friends.

P Problem-solving skills include problem recognition and definition, root cause determination, use of analytical and computational tools to determine possible solutions, and present a recommendation with justification. Critical thinking is required.

To stand out in the crowd, you need STILTs!

The CAP skills just get you in the door for consideration. As an A&T Industrial and Systems Engineering graduate, you will acquire the STILT skills to set you apart from the crowd.

S Systems thinking and synthesis skills enable one to design, evaluate and improve complex systems with multiple objectives while considering a life cycle factors such as sustainability, economics, and human factors.

T Teamwork skills build on the natural collaborative culture among our students. Such skills include visioning, team-building, facilitation, conflict resolution, and consensus-building.

I Information technology integration skills allow the improvement of enterprise systems using information technology. These skills include systems analysis, data modeling, and process modeling.

L Leadership and entrepreneurial skills enable our graduates to positively influence those within their organization and community. These skills enhance the entrepreneurial disposition of our students.

T Trans-cultural and trans-discipline skills are developed so students understand the contributions of diverse cultures and disciplines, where collaboration can be harder, but leads to better results.

Figure 2-1 CAP/STILT Student Skills

3. Relationship Between ISE Department, College and University Goals

Departmental annual goals are constructed after the department has received the annual goals of the College of Engineering. The College goals give direction and priority for departmental goals and are consistent with university strategy and goals

3.1. University Strategy

3.1.1. University Mission

North Carolina Agricultural and Technical State University aspires to be the premier interdisciplinary-centered university in America that builds on its comparative advantages in engineering, technology, and business; a strong civil rights legacy; and status as an 1890 land-grant institution. The challenges of preparing our students to meet the complex needs of the global society necessitate that these exemplary and relevant educational experiences are inherently global in nature and interdisciplinary in focus. The commitment to excellence and the unique NCA&TSU legacy of nurturing the individual student remain strong.

3.1.2. University Objectives

- Establish and ensure an interdisciplinary focus that mandates high quality, continued competitiveness, and effective involvement of partners in marketing and delivery of programs.
- Deliver visionary and distinctive interdisciplinary learning, discovery, and engagement that includes collaborations and partnership as part of the learning experience.
- Foster a responsive learning environment that utilizes efficient administrative support and effective information dissemination.
- Provide superior, readily available student services and programs that respond to diverse student needs.
- Enhance and diversify the University's resource base.

3.1.3. University Metrics

- 80% retention rate
- 50% six year graduation
- 28% four year graduation

3.2. College Strategy

3.2.1. College Mission

Provide quality educational programs in engineering and computer science that are responsive to the needs of diverse students.

3.2.2. College Vision

National model for transforming students into engineers and computer scientists who become global leaders.

3.2.3. College Metrics

- 1 Year retention rate
- 6 Year graduation rate
- 4 Year graduation rate
- Student evaluation of teaching
- BS degrees awarded
- Performance on FE Exam
- UG involvement in research
- UG going to graduate school
- MS degrees awarded
- PhD degrees awarded
- SCH
- Public service projects
- UG student aid
- G student aid
- Papers published, jointly with students
- Funds for laboratory development

In addition to annual goals, program objectives are driven by the College of Engineering objectives. The following table demonstrates consistency of the Program Objectives with those of the College of Engineering. The correspondence between Program Objectives and College Objectives is indicated by an "X".

College of Engineering Objective / BSIE Program Objective	1. Perform both technically / professionally for a variety of employers in the manufacturing and service industries.	2. Use information technology tools and systems engineering methods.	3. Function in interdisciplinary, culturally and/or globally diverse teams.	4. Contribute to their communities, the profession of industrial engineering, and the University and its constituents.	5. Engage in proactive, continuous, and life long learning including the pursuit of graduate studies.
STUDENT 1. To prepare the student for an active career in his/her chosen discipline within the profession.	X	X	X		
STUDENT 2. To provide a comprehensive background in all phases of the engineering design process, namely: conception, planning, synthesis, analysis, design, and management.	X				
STUDENT 3. To provide a basic knowledge of the mathematical and natural sciences upon which the practice of engineering depends.	X				
STUDENT 4. To develop the student's judgment to utilize effectively and economically the materials and forces of nature for the benefit of humankind.	X			X	

College of Engineering Objective / BSIE Program Objective	1. Perform both technically / professionally for a variety of employers in the manufacturing and service industries.	2. Use information technology tools and systems engineering methods.	3. Function in interdisciplinary, culturally and/or globally diverse teams.	4. Contribute to their communities, the profession of industrial engineering, and the University and its constituents.	5. Engage in proactive, continuous, and life long learning including the pursuit of graduate studies.
STUDENT 5. To develop in the student an appreciation for the process of continuing education.					X
STUDENT 6. To develop in the student the intellectual, professional, and social characteristics required of a responsible community leader.			X	X	
ORGANIZATION 1. Provide a nurturing environment and learning community that fosters academic, professional and personal growth.	X				
ORGANIZATION 2. Preserve and enhance the quality, innovativeness and diversity of our educational programs.	X				X
ORGANIZATION 3. Enhance the quality and productivity of our research programs.	X				X
ORGANIZATION 4. Contribute to the educational and economic development of the Piedmont Triad region, state and the world through strategic partnerships				X	
ORGANIZATION 5. Continuously improve our operating processes to improve efficiency and effectiveness.				X	

In addition to meeting College objectives, a similar matrix has been constructed to demonstrate that the BSIE program objectives meeting University objectives.

University Objective / BSIE Program Objective	1. Perform both technically / professionally for a variety of employers in the manufacturing and service industries.	2. Use information technology tools and systems engineering methods.	3. Function in interdisciplinary, culturally and/or globally diverse teams.	4. Contribute to their communities, the profession of industrial engineering, and the University and its constituents.	5. Engage in proactive, continuous, and life long learning including the pursuit of graduate studies.
STUDENT 1. To help students to improve their interpersonal and communication skills.	X		X		
STUDENT 2. To insure adequate career preparation for students that will enable them to lead productive lives.	X				
STUDENT 3. To develop innovative instructional programs that will meet the needs of a diverse student body and the expectations of the various professions.	X			X	
STUDENT 4. To maintain an environment which fosters quality instruction and encourages the further professional development of faculty and staff which supports the ideals of academic freedom and shared governance.	X				X
STUDENT 5. To assist students in developing their powers of critical and analytical thinking.	X				
STUDENT 6. To assist students in developing in-depth competence in at least one subject area for a global economy and for an environment with changing technology.	X	X	X		
STUDENT 7. To aid students in the further development of self-confidence and a positive self image.	X				

University Objective / BSIE Program Objective	1. Perform both technically / professionally for a variety of employers in the manufacturing and service industries.	2. Use information technology tools and systems engineering methods.	3. Function in interdisciplinary, culturally and/or globally diverse teams.	4. Contribute to their communities, the profession of industrial engineering, and the University and its constituents.	5. Engage in proactive, continuous, and life long learning including the pursuit of graduate studies.
STUDENT 8. To identify and secure additional sources for internal and external funds to support the development of competitive financial aid awards to academically qualified students and to needy students.				X	
STUDENT 9. To further develop and maintain the institutional research and planning processes that are necessary for the continued competitiveness, relevance, productivity, and credibility of the University, its programs, and its operations.	X			X	
STUDENT 10. To develop and maintain undergraduate and graduate programs of high academic quality and excellence.	X				
STUDENT 11. To encourage research and other creative endeavors by the faculty and students.					X
STUDENT 12. To identify and help to satisfy educational, cultural and other public service needs in the state, nation, and international environment.				X	
ORGANIZATION 1. Establish and ensure an interdisciplinary focus that mandates high quality, continued competitiveness, and effective involvement of partners in marketing and delivery of programs.	X		X		
ORGANIZATION 2. Deliver visionary and distinctive interdisciplinary learning, discovery, and engagement that includes collaborations and partnership as part of the learning experience.	X				
ORGANIZATION 3. Foster a responsive learning environment that utilizes efficient administrative support and effective information dissemination.	X				

University Objective	BSIE Program Objective 1. Perform both technically / professionally for a variety of employers in the manufacturing and service industries.	2. Use information technology tools and systems engineering methods.	3. Function in interdisciplinary, culturally and/or globally diverse teams.	4. Contribute to their communities, the profession of industrial engineering, and the University and its constituents.	5. Engage in proactive, continuous, and life long learning including the pursuit of graduate studies.
ORGANIZATION 4. Provide superior, readily available student services and programs that respond to diverse student needs.				X	
ORGANIZATION 5. Enhance and diversify the University's resource base.				X	

3.3. Student Profile

3.3.1. Admission Requirements

3.3.1.1. *Undergraduate Program*

In the Fall semester 2006, the college faculty voted to set the unconditional admission standard to a minimum SAT score of 1000 *and* a HS GPA of 3.0. This new criteria went into effect for the Fall 2007 freshmen cohort. Students not meeting the unconditional admission are reviewed by the departments and may be considered for conditional admission.

A student who wishes to transfer to North Carolina A&T State University to study Industrial Engineering must meet all of the University requirements for transfer, and the student must have a cumulative GPA of 2.5 (if transferring from an ABET accredited program) or above and grade "C" or better on MATH 131 and first semester English class (equivalent to UNST110 Critical Writing). After a transfer student is admitted, the Admissions Office evaluates the student's record and awards transfer credits. The transfer student advisor reviews all transfer credits with the new student and handles all appeals to the Admissions Office.

3.3.1.2. *Master's Program*

Applicants with their highest degree from non-English speaking countries must complete the Test of English as a Foreign Language (TOEFL) exam and obtain a score of 550 or above.

3.3.1.3. *Doctoral Program*

To be considered for admission to the Ph.D. in Industrial Engineering an applicant must satisfy the following requirements:

- At least one degree in engineering.
- A Bachelor of Science degree in Industrial Engineering from an EAC-ABET accredited program with a cumulative Credit Point Average of 3.7 or above on a 4 point scale.

OR

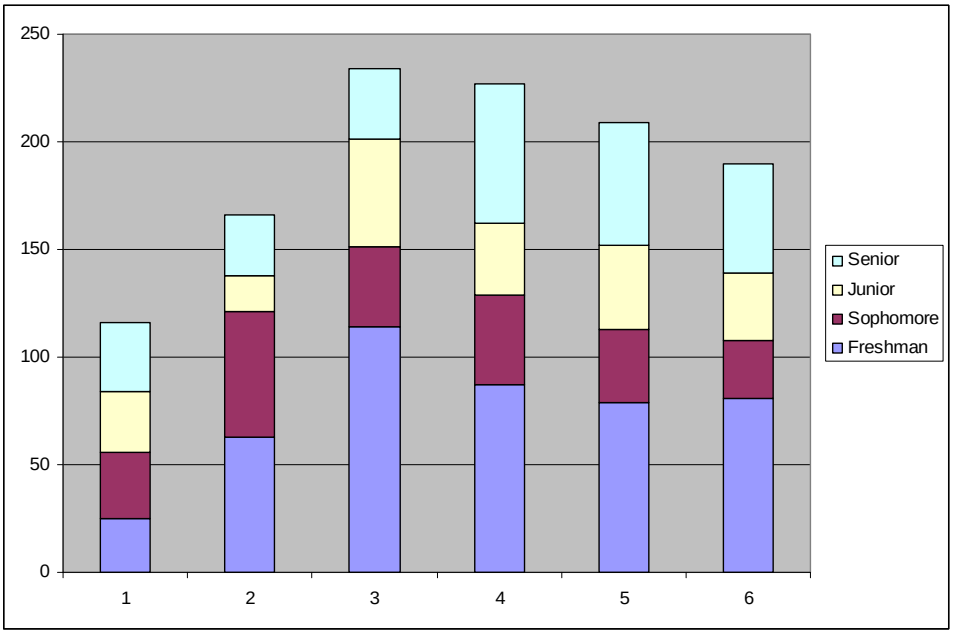
- A Master of Science degree in a discipline related to Industrial Engineering, from a college or university recognized by a regional or general accrediting agency, with a cumulative Grade Point Average of 3.3 or above on a 4 point scale.
- Complete the Graduate Record Exam (GRE) Aptitude Exam.

Applicants with their highest degree from non-English speaking countries must complete the Test of English as a Foreign Language (TOEFL) exam and obtain a score of 550 or above.

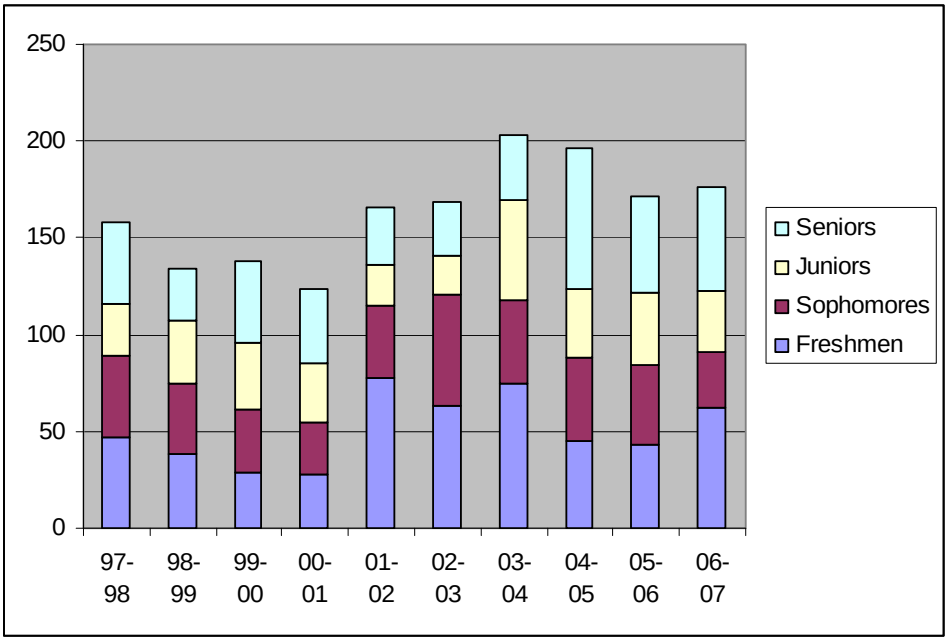
3.3.2. Student Enrollment by Program

3.3.2.1. Undergraduate Program

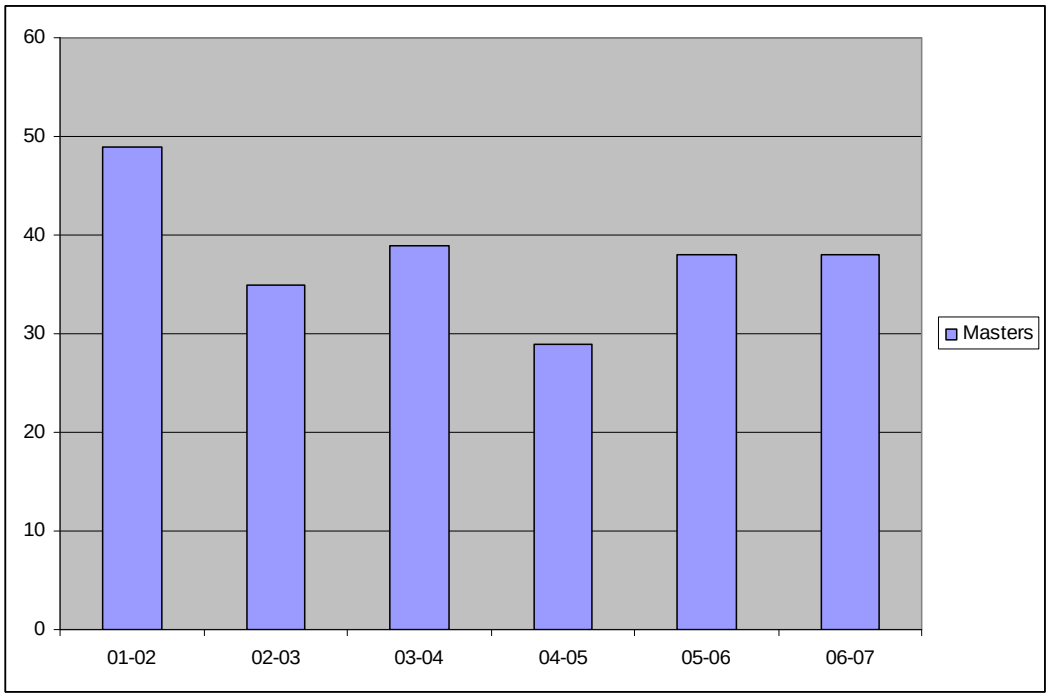
The data below is from the University headcount and includes students administratively placed in Industrial Engineering. This is an overestimate of true Industrial Engineering students.



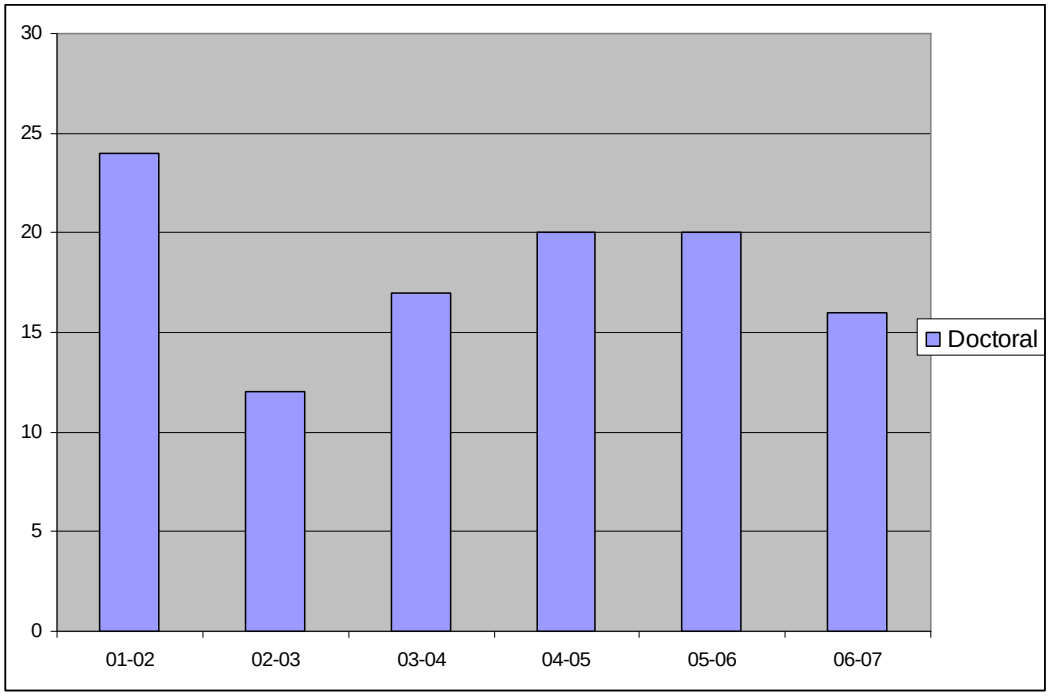
The graph below provides a clearer estimate of number of students intending to be in Industrial Engineering major.



3.3.2.2. Master's Program



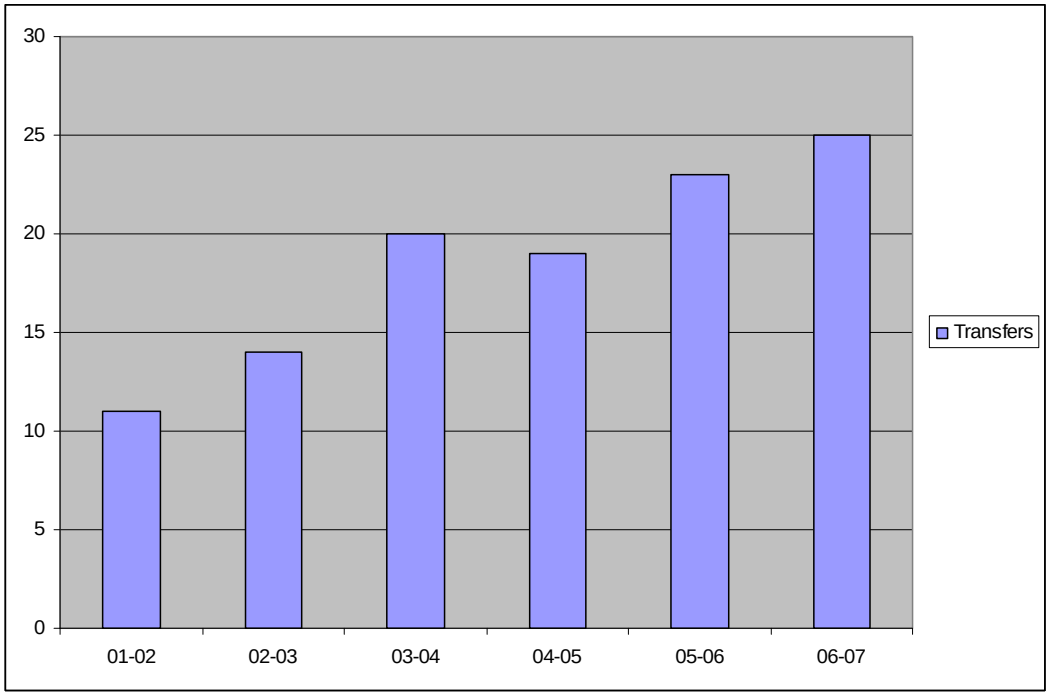
3.3.2.3. Doctoral Program



3.3.3. Student Enrollment in Honors Program

In Fall of 2007, there were 13 students in the Honor Program.

3.3.4. Transfer Students



3.3.5. Progression Requirement

3.3.5.1. *Undergraduate Program*

All students are required to achieve a 'C' or better in the following courses to satisfy graduation and prerequisite requirements: CHEM 106, MATH 131, MATH 132, MATH 231, MATH 431, PHYS 241, PHYS 242, GEEN 100, ELEN 440, INEN 260, INEN 270, MEEN 260, MEEN 313, MEEN 413.

3.3.5.2. *Graduate Program*

Students may be admitted conditionally to graduate programs where background courses must be complete.

For the Master's program, the project/thesis defense must be at least 90 days after the proposal.

For the Ph.D. program, the student must pass the Qualifying Exam, followed by the Preliminary Exam, followed by dissertation proposal, and after at least 180 days, the final defense.

3.3.6. Enrollment in Degree-Credit Distance Learning

The Department of Industrial Engineering is in the process of preparing and offering on-line courses. These have not been historically offered.

3.4. Academic

3.4.1. Licensure Examinations

The department has made recent effort to emphasize taking the FE exam. In the last two years, 18 students have taken the test with 12 passing. This level of participation in higher than in prior years. The association between FE-topics and program outcomes is shown in the table below. The lower control limit (LCL) indicating need for change is the National Average minus one standard deviation (as recommended by the American Society for Engineering Education).

Fundamental of Engineering Exam Outcome Assessment

	Program Outcome																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Topic Area	**a**	**a**	**a**	**a**	**b**	**b**	**e**	**c**	**k**	**k**	**j**	**f**	**f**	**h**	**i**	**d**	**g**
General - Chemistry		X															
General - Computers									X								
General – Dynamics*			X														
General - Electrical Circuits			X														
General – Mechanics **																	
General - Engineering Economy														X			
General - Ethics												X					
General - Fluid Mechanics			X														
General - Material Science		X															
General - Mathematics	X																
General – Statistics **	X																
General - Thermodynamics			X														
Discipline - Industrial Cost Analysis *														X			
Discipline - Computer Modeling *									X								
Discipline – Engineering Economics														X			
Discipline – Industrial Ergonomics *				X													
Discipline – Engineering Statistics	X																
Discipline – Design of Experiments *					X												
Discipline – Facility Design and Location / Logistics								X									
Discipline – Information Systems Design *									X								
Discipline – Industrial Management								X									
Discipline – Manufacturing Processes *				X													
Discipline – Manufacturing Systems *								X									
Discipline – Material Handling *								X									
Discipline – Math Optimization *				X			X										
Discipline – Production Management *								X									
Discipline – Statistical Quality Control *				X													
Discipline – Total Quality Management *								X									
Discipline – Queuing Theory *				X			X										
Discipline – Simulation *							X		X								
Discipline – Work Methods *				X													
Discipline – Modeling and Computation **				X			X										
Discipline – Manufacturing and Production Systems **								X									
Discipline – Human Factors, Productivity, Ergonomics, Work Design **				X													
Discipline – Quality **				X				X									

* - Stopped after 2005 ** - Began in 2006

3.4.2. Accreditation Reviews

The BS in Industrial Engineering received a favorable ABET report and has been accredited for the maximum period of six years.

Consistent with the practice of all prominent engineering schools, the department does not apply for accreditation of graduate programs.

3.4.3. Internal Program Reviews

Two external boards provide reviews for the department. The Industrial Engineering External Advisory Board (EAB) meets twice a year to review departmental mission and programs. The EAB also serves as an advocate for the department providing feedback and suggestions to University, College and Department representatives.

The second board, the Program Advisory Council (PAC) focuses solely on the BSIE program. This board was initiated in 1999 to address ABET requirements that the department seek direct input from the various constituencies of our program to assess the adequacy and appropriateness of the program objectives. The mission, composition and role of the PAC are given below.

Mission of the PAC
To provide guidance to the BSIE program administration.

Objectives of the PAC
- Review BSIE Program objectives and suggest changes as needed
- Examine curriculum, facilities and faculty strengths for appropriateness with respect to program objectives

Organization of the PAC
The Program Advisory Council will consist of members invited from the following constituencies:
- Industrial Engineering faculty
- Representatives from local business and industry
- Representatives from current employers of NC A&T Industrial Engineering
- Alumni of the BSIE program
- Current students
- Leadership of the Student Chapters of IIE, Alpha Pi Mu, and HFES
- Parents of current students
- Representatives from funding agencies: State, Federal, Private

Meeting Schedule of the PAC
The Program Advisory Council will meet once every three years on the NC A&T Campus.

Each of the different kinds of constituents attended the PAC meetings held since the last ABET visit. One meeting occurred in spring 2002 and one in fall 2005. Meeting notes are available during the visit.

The primary purpose of the 2002 meeting was to review the changes driven by the last ABET visit. A key outcome of this meeting with a suggestion to increase economic content in the curriculum.

The primary purpose of the 2005 meeting was to review revised program objectives and outcomes. These revised objectives had been constructed by departmental faculty in a series of meetings in 2005. The objectives were approved by the PAC. Some discussion suggested the addition of superlatives to address quality of performance. An additional suggestion was the formalization of internships as a part of the educational process.

3.4.4. Retention and Graduation Rates

3.4.5. Alumni Surveys

The 2005 College of Engineering Alumni Survey was purposefully constructed to address the degree to which graduates of the various undergraduate programs are achieving their respective program objectives. Additional questions were included for ISE graduates in order to assess objectives unique to the Department of Industrial & Systems Engineering. Results from the survey are summarized below:

1. Perform both technically and professionally for a variety of employers in the manufacturing and service industries.
    - Graduates are working in a wide variety of fields including: government, construction, manufacturing, product engineering, academia and health care
    - 83% or respondents indicate their salaries are equal to or above those of their peers in similar positions
    - 83% are satisfied with their career advancement
    - 91% are satisfied with their career choice
    - 88% were employed fulltime, 8% were employed part time, and 4% were unemployed but not seeking employment

2. Use information technology tools and systems engineering methods.
    - 89% of respondents spend at least 50% of their time using IT tools at work
    - IT tools identified include: MS Office products, database, CAD/CAM, optimization, simulation, flowcharting and programming
    - 95% of respondents indicate the use of IT tools has been important in career success
    - A wide variety of systems methods are being used by ISE graduates including: six sigma, lean manufacturing, total quality management, data modeling, process modeling, and time study/predetermined time systems

3. Function in interdisciplinary, culturally and/or globally diverse teams.
    - 100% indicate the ability to work in teams is important

- 92% indicate teamwork is a job requirement
- 80% spend at least 25% of their time in teams
- 52% spend at least half of their teamwork time as team leaders, 81% spend at least a quarter of their time leading teams
- 58% of respondents time in teams is interdisciplinary in nature

4. Contribute to their communities, the profession of industrial engineering, and the University and its constituents.
    - 63% have taken on some type of leadership role in a professional society
    - 71% have filled a leadership role in a community organization
    - 52% have volunteered time in K-12 activities
    - 76% have encouraged students to attend NCA&T
    - 52% have helped recruit A&T graduates as employees
    - 36% have given back financially to NCA&T
    - 24% have served on an advisory board at NCA&T
    - 20% have come back to speak to students at NCA&T
    - 32% were members of the alumni association

5. Engage in proactive, continuous, and life long learning including the pursuit of graduate studies.
    - 42% have participated in conferences at the local, state or regional level
    - 35% have participated in a national conference since graduation
    - 50% have completed special training for certification
    - 20% had taken and passed the FE exam

3.4.6. Continuing Education

From the Alumni Survey:

- 42% have participated in conferences at the local, state or regional level
- 35% have participated in a national conference since graduation
- 50% have completed special training for certification
- 20% had taken and passed the FE exam

3.4.7. Employer Surveys

Due to changing employer practices, the Department has discontinued use of formal employer surveys.

3.4.8. Student Experiences

Academically, course learning objectives have been defined for all courses and are included in the course outlines. Student surveys are conducted at the end of each semester to determine the degree to which these learning objectives have been achieved. Survey results are summarized by course, and are reviewed by course committees once a year (following the offering of those courses). The survey results are used to provide student-centered insight into which aspects of the courses are well understood, and which need improving or extra emphasis the next offering.

3.4.8.1. *Student Activities*

There are three student chapters in the Department: the Institute of Industrial Engineers (IIE), the Human Factors & Ergonomics Society (HF&ES) and the Alpha Pi Mu Honor Society. The Department recognizes the important role of student organizations in education, and continues to provide strong support for these organizations. The reports of these organizations are in the sections below:

Institute of Industrial Engineers (IIE)

Some of the 2006-7 activities in which members of the organization participated include:

Community Service

The members of IIE participated in several community service activities throughout the academic year. These activities included a drive for canned goods for the Greensboro Urban Ministries, Freshmen Mentoring, Math and Chemistry tutors in the department, and a host of other activities that required that the students serve as ambassadors for the department during campus career fairs.

Conference

This year's regional conference was hosted by the Virginia Tech University. The conference was held February 8 through February 11 in Blacksburg Virginia. Approximately 12 students from A&T attended the conference. Members attended workshops, went on plant tours at ALTEC and UPS and presented two technical paper at the technical paper competition.

Fundraising

During this academic year, the organization did not conduct any fundraiser. However, there will be at least one fundraiser for the upcoming school year, 2007-2008.

Social Events / Leadership activities

IIE teamed up with HFES and Alpha Pi Mu to host an ISE Kick-off Cookout in September.

In additions, IIE teamed up with HFES in the fall semester to host a game night. This allowed for the students to have a break from studying and enjoy getting to know each other.

IIE coordinated two very successful plant tours. In the first semester a tour to DELL in Winston Salem provided industrial exposure to about ten students. This was followed up in the second semester with a visit to General Electric Consumer and Industrial in Mebane, North Carolina. About 15 students attended the GE Plant Tour.

IIE also participated during Engineers Week 2007, by hosting several information sessions with Cummins and Miller Brewing Company. The organization also hosted a speed meeting and networking workshop sponsored by Hewlett Packard. This workshop allowed students to develop their 3 minute "elevator speeches," and understand the importance of networking.

Other Announcements

In the fall semester IIE's membership increased considerably from 30 members to 60 members, our goal for next year is to attract more freshmen students to the organization.

Alpha Pi Mu

Fall 2006

1. Freshman and Transfer Student Mentor Program:
   This program is intended to help students new to the Department of Industrial and Systems Engineering acclimated to college life. Members of Alpha Pi Mu held several weekly one hour meetings with these students in order to achieve the objective of the program.
2. Lincoln Academy Math Help
   Members of Alpha Pi Mu volunteered several hours weekly at this local school in order to provide assistance with the needs of its students in math. The objective of this project was to help these students achieve skills necessary to pass end of grade testing.
3. Freshman Cookout
   With the help of IIE and HFES, the organization welcomed incoming freshman to the department.
4. Miss A&T Coronation
   This is the first year that Alpha Pi Mu was represented in the coronation activities. Ms. Khaliah Hughes represented Alpha Pi Mu.
5. Miss A&T's Queens Retreat
   Ms. Khaliah Hughes represented Alpha Pi Mu in this activity.

Spring 2007

1. Completing Online Applications Workshop– Feb 20
   This workshop includes tips for successfully applying for jobs online and to tailor their resume to job descriptions to increase likelihood of getting the interview.
2. Hosted Info Session For General Motors
   Successfully hosted evening info session for General Motors
3. Hosted Info Session For IBM
   Successfully hosted evening info session for IBM

Human Factors and Ergonomics Society (HFES) Student Chapter

The North Carolina Agricultural & Technical State University HFES Chapter began activities in September 2006, which consisted of general/executive body meetings, and other campus activities hosted by HFES. The campus HFES chapter is becoming more visible among the undergraduate and graduate community due to the activities in the Fall 2006 semester.

Activities ranged from co-hosting the Industrial Engineering freshman cookout to donating coats to needy adults and children. The society also designed a logo for the North Carolina Agricultural & Technical HFES Chapter banner.

Summary of HFES 2006-2007 Activities:

1. Lunch & Learn Session (10/12/2006): Interaction with HF faculty on HF career and other issues.

2. Outreach Program: Information session for INEN 371- Human Factors (08/08/2006): Executives provided information on the organization as a membership drive effort to undergraduate HF class.
3. Game Night with IIE (11/17/2006): Socializing event intended to bring members together.
4. Canned food drive with IIE (Whole month of November): Collected and donated canned food items to charity as community service.
5. E-Week Workshop on "Working on a Global Team" (02/20/2007): E-week activity sponsored by organization with facilitators from Michelin Corporation.
6. Valentine Flower Sale (02/14/2007): Sale of rose flowers as a fund raising activity.
7. Career/Graduate school preparation seminar (04/13/2007): Round table discussion featuring graduate students and speakers from industry aimed at preparing HF seniors for their next steps.
8. General body meetings (9/15/2006; 10/24/2006; 11/21/2006, 01-26-2007*)
9. Executive meetings (9/8/2006; 10/17/2006; 11/14/2006)

3.4.8.2. *Student Professional Experiences:*

Employers

Most of the Industrial Engineering students who received their BSIE, MSIE, or Ph.D from North Carolina A&T State University are gainfully employed by various organizations or are pursuing higher degrees. This was an excellent year in terms of placement as most of the graduates received multiple job offers. Students graduating from the Industrial Engineering program in 2006 - 2007 accepted employment offers from the following organizations:

- Arco Precision Machine
- Bank of America
- Boeing
- Booze Allen
- Caterpillar
- Corning
- Cummins Diesel
- Delphi
- East Carolina University
- General Electric
- General Motors
- Intel
- JP Morgan
- Lockheed Martin
- Toyota
- US Navy

ISE Internships and Coops

The following table contains the ISE students that participated in summer internships, co-ops, and exchange programs during the 2005 - 2006 academic year. However, all of the summer intern locations have not been tracked.

		Internships	Co-ops		Study Abroad
Name	**Class**	**Summer 2006**	**Fall 2006**	**Spring 2007**	**Sum/Fall 2006**
Baker, Christopher	SR	General Motors Detroit, MI	-		-
Barrett, Travis	SR	Rockwell Collins Cedar Rapid, IA		RF Micro Devices Greensboro, NC	-
Benson, Koray K.	SR	-	-		FIPSE Universodade Federal do Rio de Janeiro, Brazil
Brown, Eric T.	SR	Dept of Transportation City of Greensboro, NC	City of G'Boro./Dept of Transportation Greensboro, NC	-	
Bryd, Ushe S.	GR	Cummins Rocky Mount, NC			
Clinkscales, Asia	GR	Milliken Greenville, SC			
Collins, Victor	SR	Harvard Business Program Harvard University	-	-	
Dunn, Shari	SR	Raytheon Boston, MA	Raytheon Boston, MA		
Grange, Tambra	SO	Delphi Steering Saginaw, MI			
Helper, Channel	GR	XEROX Corp. Webster, NY			
Howze, Tamario	GR	Delphi Steering Saginaw, MI			
Hughes, Khaliah	SR	Goodyear Danville, VA			
Jackson, Maurice	SR	IBM Up State, NY	Telemarketing Firm Atlanta, GA		
Lloyd, Kelvin R.	JR	US Environmental Protection Agency Durham, NC			
Marson, Mieka	SR	Spawar Charleston, SC			
Michael, Tyrone S.	GR	Summer 2006			
Miller, Eric Paul	SO	-	-		FIPSE Universodade Federal do Rio de Janeiro, Brazil
Moore, Garland	JR	Toyota Mfg. Georgetown, KY	-	-	
Mullins, Kenneth	SR	General Motors Detroit, MI			
Sanders, Takia	SR	Delphi Steering Saginaw, MI			

Simms, Cabria	JR	-	NCO Customer Mgmt, Inc. High Point, NC		
Smith, Angelo G.	SR	GE Greenville, SC			
Smith, Michael	GR	ABB Greensboro, NC	ABB Greensboro, NC	ABB Greensboro, NC	
Tinnin, Deanna	GR	GE Milwaukee, WI	-	-	
Trevino, Paola	SR			Guilford Mills Greensboro, NC	
Valentine, Lauren	SR	UPS Northeast, PA			
Washington, Leonard	GR	GE Greenville, SC	-	-	
Williams, Porsche	GR	GE Milwaukee, WI	-	-	
Stinson, Brittany	JR	General Electric Energy Atlanta, GA	-	-	
Vinson, Rikki	JR	GE Milwaukee, WI	-	-	
Wilson, IV, Herbert	JR	-	Dell Direct Store Greensboro, NC	-	

4. Faculty Development and Quality

4.1. Faculty Evaluation

4.1.1. Appointment, Promotion, and Tenure

As stated in the Faculty Handbook for North Carolina A & T State University:
"*Academic tenure* refers to the conditions and guarantees that apply to a faculty member's employment. More specifically, it refers to the protection of a faculty member against involuntary suspension or discharge from employment or reduction in rank by North Carolina Agricultural and Technical State University except upon specified grounds and in accordance with the procedures provided in Section 4 of these regulations or against termination of employment except as provided for in Section 6.

The intended purposes of according the protection of academic tenure to faculty members are to secure their academic freedom and to help the institution attract and retain faculty members of the high quality it seeks. While academic tenure may be withheld on any grounds other than those specifically stated to be impermissible under Section 5. A, its conferral requires an assessment of the faculty member's demonstrated professional competence; his/her potential for future contributions; his/her commitment to effective teaching, research, or public service; and the needs, resources, and the mission of the institution."

The processes and expectations for the granting of reappointment, tenure, or promotion for the Department of Industrial and Systems Engineering are consistent with and subject to University and College of Engineering processes and expectations. Associated process are described in Appendix B of the university Faculty Handbook. The department chairperson and Reappointment, Promotion, and Tenure (RPT) committee will fulfill roles as described therein. Where numbers permit, departmental RPT committee members are elected at the College level.

The Department of Industrial and Systems Engineering mission requires faculty contribution in the areas of teaching, research, and service. As a doctoral granting department at a High Research Activity university, reappointment, tenure, and promotion applicants are assessed in terms of scholarly *productivity* and *quality* in each of these areas. The criteria for evaluation of faculty are described in Appendix C of the Faculty handbook.

Tenure track faculty will be given feedback from the chairperson on an annual basis and feedback from the RPT committee at the time of reappointment application. This information is intended to inform the faculty member concerning current progress. A recommendation for reappointment is based on the demonstration by the applicant of his/her potential to reach performance worthy of promotion to associate professor with academic tenure.

In terms of expectations for the granting of permanent tenure and increase in rank from assistant to associate professor, the department abides by any minimum standard for application for the University or College. These standards are not sufficient to acquire promotion and tenure. In general, the applicant should demonstrate the potential to gain national recognition for the faculty member's contributions in scholarship and leadership. Demonstration of potential includes progressive improvement in teaching, research, and service as well as areas of concern indicated by reappointment committee review and chair annual reviews.

In terms of expectations for change in the rank from associate to full professor: the applicant should have gained national recognition for the faculty member's contributions in scholarship and leadership.

Cumulative contributions by an individual which lead to significant program improvement and recognition might be heavily considered in addition to individual accomplishments in the areas of teaching, research and service.

4.1.2. Salary Assessment

Salary assessment is conducted according to the rubric on the next page. Chairs evaluation would include :

Service Evaluation

- Level of activity and contribution to departmental/college/university committees
- Special effort to improve first year retention and six year graduation rate
- Special effort to recruit high quality undergraduate and graduate students
- Special effort to assist students in passing the FE exam
- Level of activity and contribution to K-12 education
- Level of activity and contribution to IE profession
- Level of activity and contribution to Piedmont Triad economy

Teaching Evaluation: (in addition to consideration of student evaluation)

- Successful application of effective teaching techniques
- Laboratory development and use
- Teaching large classes
- ABET program improvements

Research: *(in addition to consideration of other research metrics)*

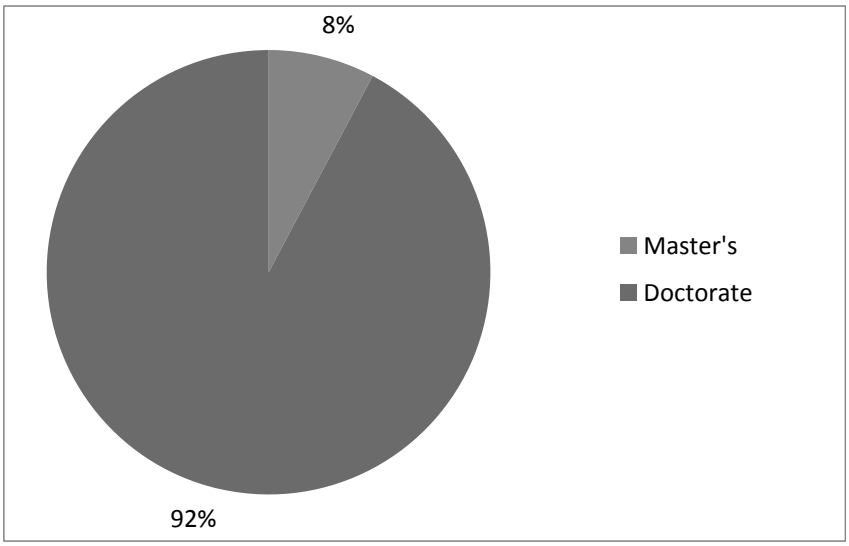
- Pursuing partnerships and conducting interdisciplinary research
- Nature and level of research funding/publication
- Success at getting students to pursue next level
- Development of research laboratories

	FACULTY MEMBER:		Period Covered: May 1, 2006 - April 30, 2007				
	DEPARTMENT: Industrial & Systems Engineering						
NO.	SELECTION CRITERIA	FORMULA/DESCRIPTION	Max. Precent (%)	Number (X)	Wt. Factor	Pt's Earned	Corrected Pts
	SERVICE (20 POINTS)		20%			0.00	0.00
1.0	Chair's Review (including professional society contribution, recruitment, and UG advisement)			0.00	4.00	0.00	
	TEACHING EFFECTIVENESS (30 - 50 POINTS)		40%			0.00	0.00
2.0	Student Opinion Form		66%	0.00	5.36	0.00	
3.0	Chair's Review (including Peer Evaluation)		34%	0.00	2.64	0.00	
	RESEARCH EFFECTIVENESS (30 - 50 POINTS)		40%			0.00	0.00
4.0	**Proposals**		20%			0.00	0.00
	a. Proposals Submitted						
	i. Principal	2*X (X=0 and Integer)		0.00	2.00	0.00	
	ii. Co-Principal	1*X (X=0 and Integer)		0.00	1.00	0.00	
	b. Funded Proposals						
	i. Principal	1.0*X (X=0 and Integer)		0.00	1.00	0.00	
	ii. Co-Principal	0.5*X (X=0 and Integer)		0.00	0.50	0.00	
	c. Continuing Research Projects						
	i. Principal	1.5*X (X=0 and Integer)		0.00	1.50	0.00	
	ii. Co-Principal	0.75*X (X=0 and Integer)		0.00	0.75	0.00	
5.0	**IE Related Technical Publications**		35%			0.00	0.00
	a. Journal Publications/Chapter in Text Book or Text Book /Proceedings Editor						
	i. First Author	5.0*X (X=0 and Integer)		0.00	5.00	0.00	
	ii. Other Authors	2.5*X (X=0 and Integer)		0.00	2.50	0.00	
	b. Refreed Conference Proceedings						
	i. First Author	1.5*X (X=0 and Integer)		0.00	2.50	0.00	
	ii. Other Authors	0.75*X (X=0 and Integer)		0.00	1.00	0.00	
	c. Technical Presentation or Other Reviewed Publications						
	i. First Author	1.0*X (X=0 and Integer)		0.00	1.00	0.00	
	ii. Other Authors	0.5*X (X=0 and Integer)		0.00	0.50	0.00	
6.0	**Student Support ***		20%			0.00	0.00
	a. Advising and Providing Monetary Support for One Ph. D. Student	2.5*X (X=0 and Integer)		0.00	2.50	0.00	
	b. Advising and Providing Monetary Support for One MS Student	2.0*X (X=0 and Integer)		0.00	2.00	0.00	
	** c. Advising and Providing Monetary Support for one Undergraduate Student	0.5*X (X=0 and Integer)		0.00	0.50	0.00	
	* d. Co-Advising and Providing Monetary Support for One Ph.D. Student	2.5*X (X=0 and Integer)		0.00	1.25	0.00	
	* e. Co-Advising and Providing Monetary Support for One MS Student	1.25*X (X=0 and Integer)		0.00	1.00	0.00	
7.0	**Chair's Review**		25%	0.00		0.00	0.00
	TOTAL POINTS					0.00	0.00
	* If not providing monetary support, then half credit.						
	** For research						
		Faculty: _____			Date: _____		

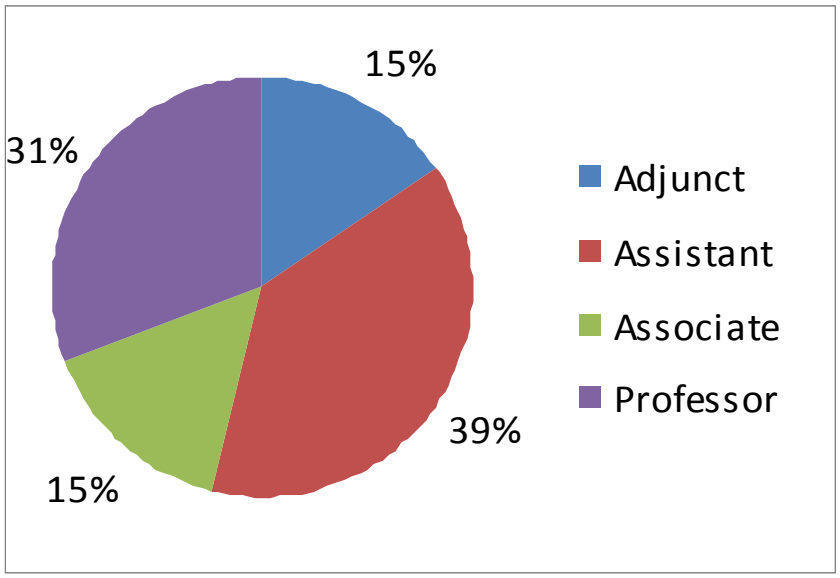
4.1.3. Faculty profile:

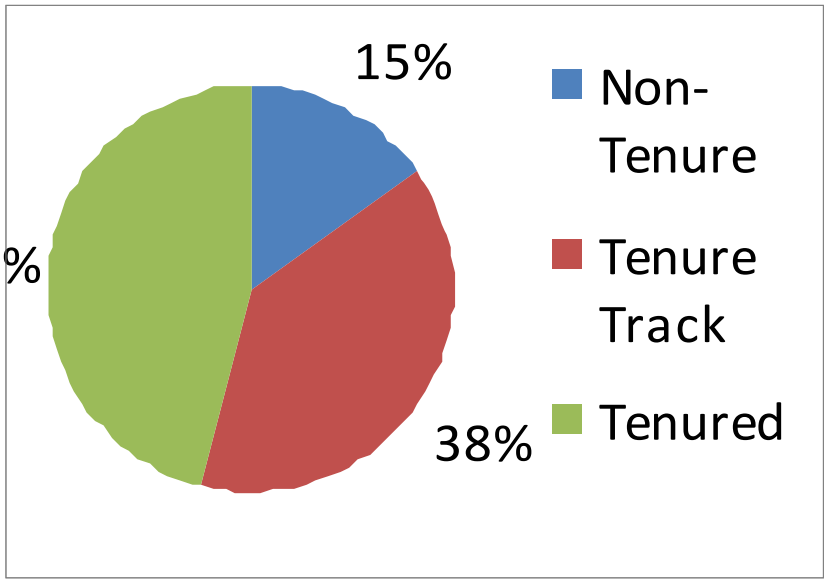
Name	Rank	Tenured	Gender	Race	Age Range
Davis, Lauren	Assistant Professor	No	F	Black	30 - 39
Desai, Salil	Assistant Professor	No	M	Asian	30 - 39
Jiang, Xiaochun	Assistant Professor	No	M	Asian	30 – 39
Mountjoy, Daniel	Adj. Asso. Professor	No	M	White	30 – 39
Ntuen, Celestine	Professor	Yes	M	Black	50 – 59
Oneyear, Steve	Adj. Asso. Professor	No	M	White	50 – 59
Park, Eui	Professor	Yes	M	Asian	50 – 59
Ram, Bala	Professor	Yes	M	Asian	50 – 59
Samanlioglu, Funda	Assistant Professor	No	F	White	30 – 39
Sarin, Sanjiv	Professor	Yes	M	Asian	50-59
Seong, Younho	Assistant Professor	No	M	Asian	40 – 49
Stanfield, Paul	Associate Professor	Yes	M	White	40 – 49
Udoka, Silvanus	Associate Professor	Yes	M	Black	40 – 49

4.1.4. Highest Degree

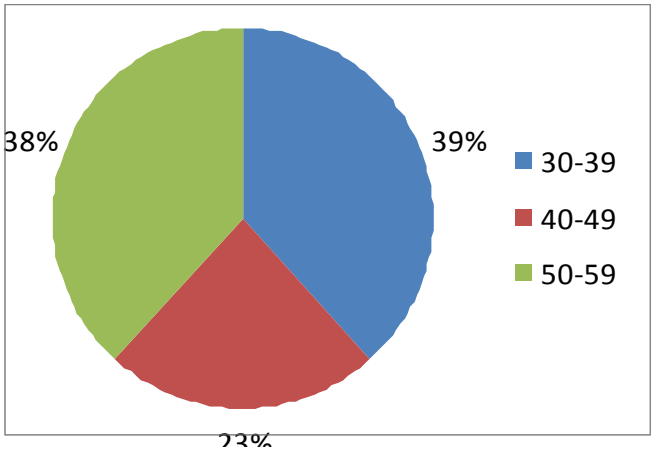


4.1.5. Rank and Tenure

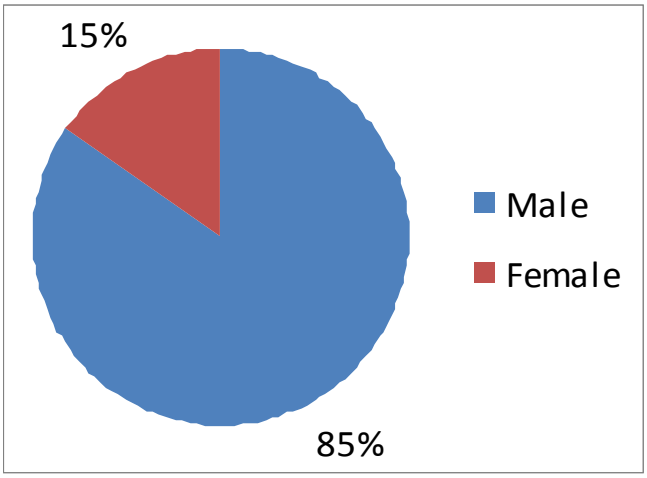




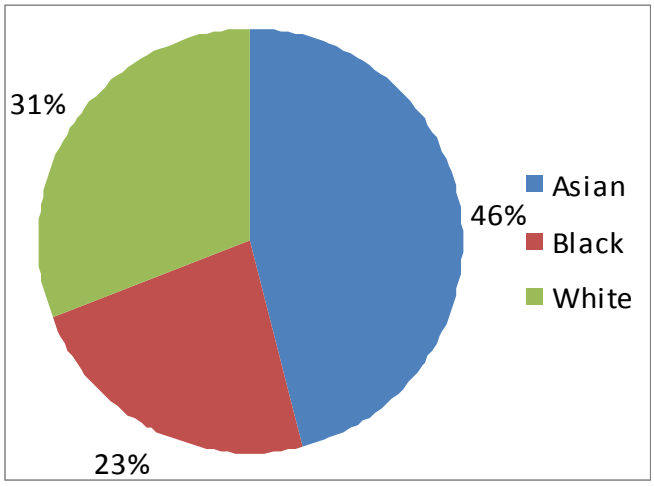
4.1.6. Age



4.1.7. Sex



4.1.8. Race



5. Progress Toward University's Mission

5.1. Access (past 3-5 years)

5.1.1. Enrollment Trends

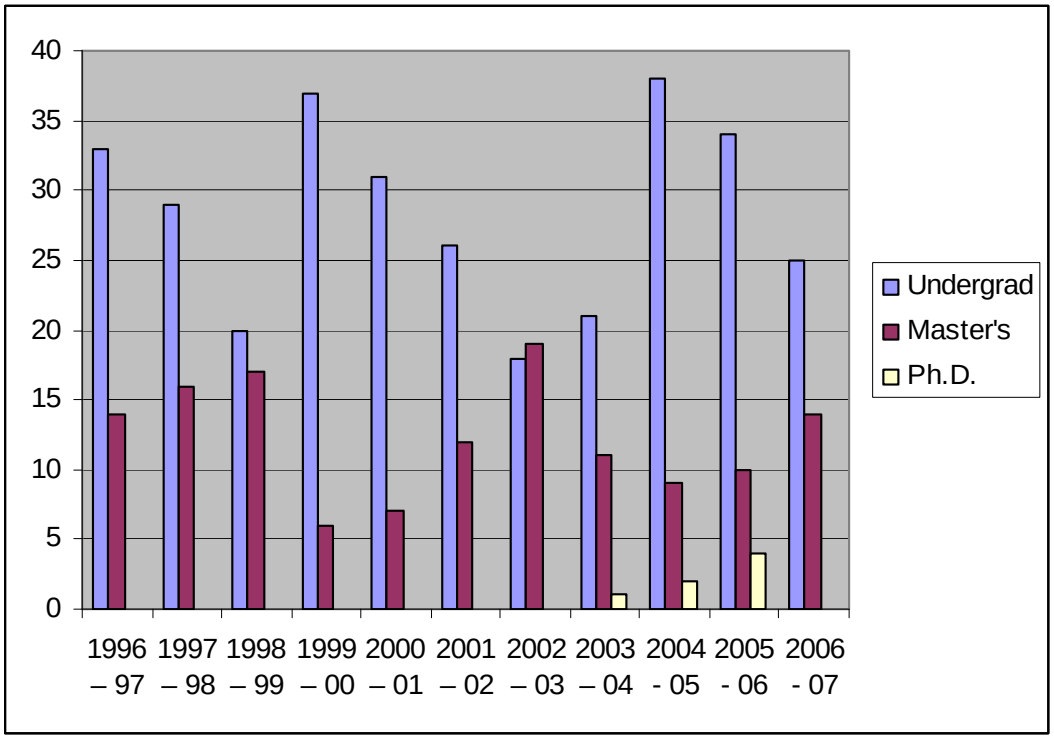
The need for Industrial Engineers is rising. The discipline has experience significant growth internationally. In the US, there have been challenges because the discipline is not well-understood. With trends of globalization and complexification, the need for the skill set of Industrial Engineers is expected to grow.

Enrollment at NC A&T State is difficult to analyze because many students were administratively placed in Industrial Engineering yet were pursuing other majors. Actual enrollment of those desiring Industrial Engineering has grown to be about 180.

5.1.2. Enrollment of Undergraduate Transfers

Traditionally, Industrial Engineering has a large number of transfers from other engineering disciplines and from older students coming back for later degree. It is expected that changes in the college of engineering undergraduate program consistency might further enhance transfer students.

5.1.3. Awarding of Degrees



5.2. Faculty Development

Faculty development activities in 2006-2007 included:
The faculty of the Industrial and Systems Engineering Department participated in numerous professional growth and service activities including:

Dr. Davis

- DOR Writing Winning Grants (10/27/06)
- ATL Summer teaching Institute (5/15/06-5/16/06): Creating Significant learning experiences in your courses.
- INFORMS Annual Conference Pittsburg,2006
- Industrial Engineering Research Conference
- Attended Student Banner Training Workshop
- 4th Annual New Faculty Colloquium, IIE, Orlando, Florida, May 20, 2006
- Reviewer, NSF Education I-P070797 SBIR/STTR

Dr. Desai

- NSF- Proposal writing workshop: Honolulu, Hawaii, March 23, 2007.
- Attended workshop on Effort Training, NC A&T SU, Feb 2007
- Industrial Engineers Research Conference – IERC, Florida, May 2006
- International Conference on Innovation & New Product Development, RMK College of Engineering, Chennai, India, Dec 19-21, 2006
- International Conference on Advanced Nanomaterials, Indian Institute of Technology
- IIE Newsletter Editor, Piedmont Triad Region, 2006 - 2007
- Volunteer instructor for FE Review Course, (Statics, Dynamics, Fluid Mechanics, Materials and Thermodynamics lectures)
- Reviewer for International Journal of Nanomanufacturing, April 2007
- Reviewer for ASME – Journal of Tribology, Feb 2007
- Reviewer for Proceedings of Industrial Engineers Research Conference, March 2007
- Reviewer for Proceedings of ASME Congress, Sep 2006
- Attended Student Banner Training Workshop

Dr. Jiang

- Reviewer, International Journal of Industrial Ergonomics
- Human Factors and Ergonomics Track Co chair, 2007 Industrial Engineering Research Conference
- Session Chair, 2007 Industrial Engineering Research Conference
- Panelist, CCLI Phase 2 and 3, NSF, Washington DC, March 2007
- Attended Finance Banner Training Workshop
- Attended Student Banner Training Workshop
- Attended Ethics Workshop
- Attended After-fact Workshop

Dr. Mountjoy

- ATL Retention workshop, January 2007
- Attended Student Banner Training Workshop

Dr. Ntuen

- Paper Reviews:
  - European Journal of Industrial Engineering (1 paper)
  - Human Factors Conference (2 papers)
  - Military Review Journal (1 paper)Board member,
- Panelist member, ORAU-NSF Graduate Research Fellowship Evaluation
- President, IIE Senior Chapter
- Cognitive models of sensemaking for military C2, CCRTS, San Diego, June 22-23, 2006
- Asymmetric warfare network performance modeling, ICCRTS, Devere University, Cambridge, UK,
- Professional conferences attended
- International Command & Control Research Symposium (ICCRTS), Cambridge, UK, July 26-30,, 2006
- Command & Control Research Symposium (CCRTS), San Diego, June 22-26, 2006
- IIE Conference, Orlando, FL, May 20-24
- Navy Opportunity Conference, National Sheraton, Arlington, VA, March, 2007
- Attended Student Banner Training Workshop

Dr. Park

- Paper Reviews:
  (1) Computers and Industrial Engineering (2 papers)
- Curriculum review – American Council for Education
- Proposal review – Nation Research Council
- External Advisory Board member, IE Department, Ohio University (until December 2006)
- Attending a few professional conferences and workshops.
- Visiting a few other universities to learn their system
- Attended Finance Banner Training Workshop
- Attended Student Banner Training Workshop

Dr. Ram

- Reviewed papers for International Journal of Production Research, European Journal of Industrial Engineering
- Served on NSF SBIR panel
- Attended Student Banner Training Workshop

Dr. Samanlioglu

- IIE member, responsible for High School Relations
- Campus workshop on Banner Student Training, February 22, 2007
- The "Write Winning Grants" Seminar, NC A&T State University, October 27, 2006.
- Campus workshop on Banner Finance Training, September 14, 2006
- 4th Annual New Faculty Colloquium, IIE, Orlando, Florida, May 20, 2006

- Summer Teaching Institute, Creating Significant Learning Experiences, NC A&T State University, May 15-16, 2006.
- The 7th International Conference devoted to Multi-objective Programming and Goal Programming, Loire Valley, France, June 12-14, 2006

Dr. Seong

- Reviewer, Applied Ergonomics
- Reviewer, International Journal of Industrial Ergonomics
- Technical Chair for the Human Interaction with Complex Systems and 1st Symposium on Sensemaking. Greenbelt, MD.
- Session Chair for the Institute for Industrial Engineering Research Conference, Orlando, FL.

Dr. Stanfield

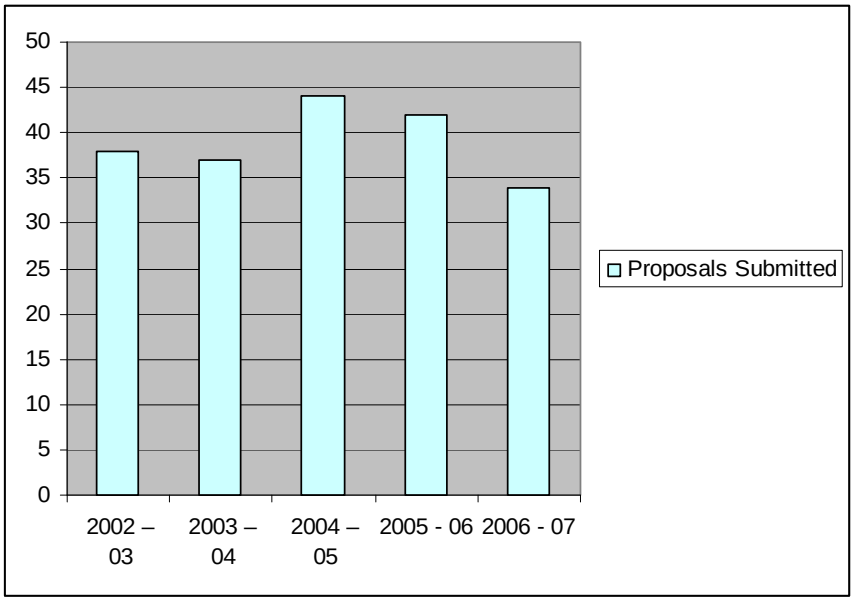
- Reviewer, NSF CCLI Phase II
- Attended Engineering Education Leadership Institute
- Attended Engineering Chair Development
- Attended Finance Banner Training Workshop
- Attended Student Banner Training Workshop

Dr. Udoka

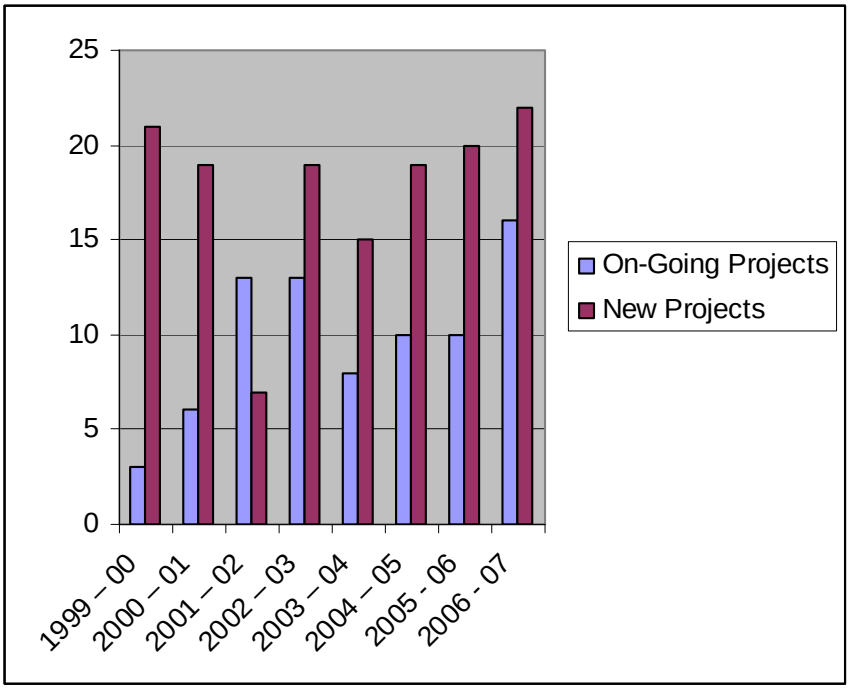
- Sponsored (through FUTURES Grant) a joint IIE/SME/ASQ Senior Chapter meeting held on Jan. 25, 2007 – Six Sigma Green Belt Certificate presentation to our students
- Member, International Technical Committee, Africa-USA Conference on Manufacturing Technology, 2004-2007
- Reviewed 2 papers for 2007 IERC Conference – "Development of a Soft Sensor Category for Industrial Process Fault Detection and Diagnosis" and "Applying a Modeling Risk Management Framework to Improve Modeling Value".
- 2006 Industrial Engineering Research Conference , Orlando, FL – May 20-24, 2006
- 2006 ASEE Annual Conference, Chicago, IL - June 19-21, 2006
- Challenges for Research Ethics at Land Grant Universities, NCSU – Oct. 27, 2006
- NSF-CCEFP Annual Conference, Atlanta, GA – April 11-13, 2007
- Division for Research and Economic Development/Caterpillar Workshop – April 3, 2007

5.2.1. Discovery

5.2.1.1. Number of applications

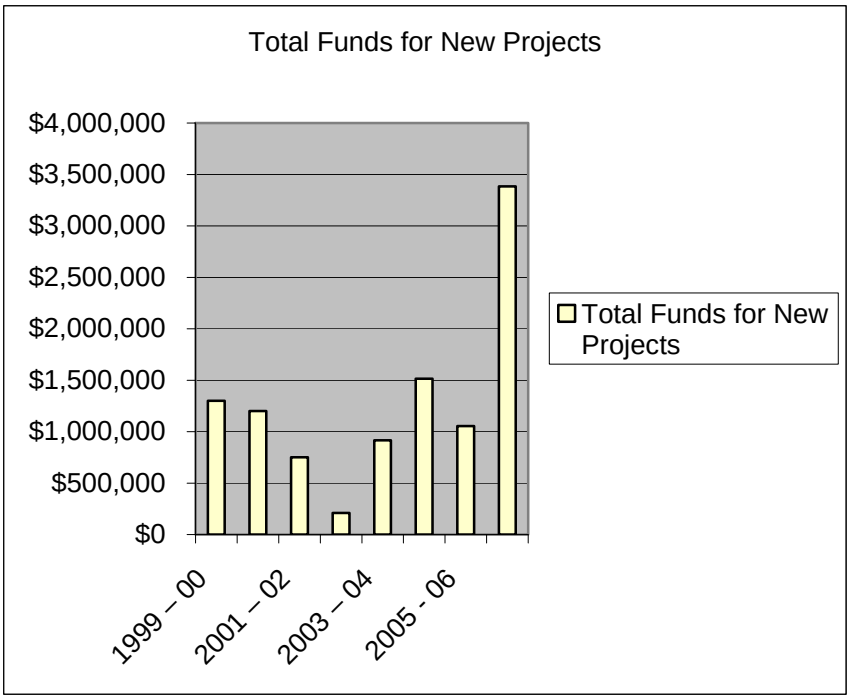


5.2.1.2. Number of awards or grants and total amount



5.2.2. Engagement

5.2.2.1. Number and dollar amounts of grants and contracts



5.2.2.2. Community service activities

A list of community activities for 2006-2007 is given below.
Note: List contains General Engineering faculty supervised by Department of Industrial Engineering.

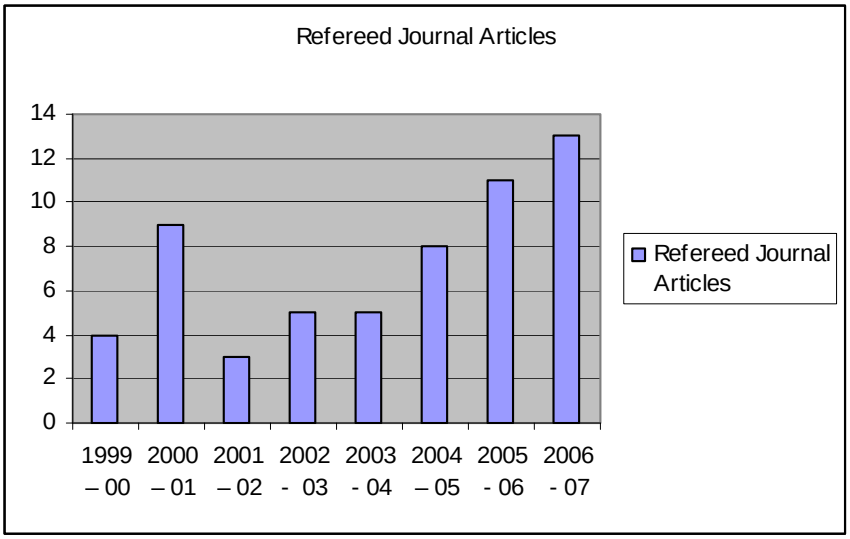
Faculty/Staff	Agency	Activity
Alford	• Lindley Elementary School • Black Child Development Institute • YWCA	• Coordinated engineering students serving as lunch buddies and tutors • Served as host to the Entering the College Zone program for middle school students Fall 2006 • Coordinated engineering students serving as mentors and facilitators of modules in engineering to middle school students – sustainability of FUTURES SOS 2006-2007
Desai	• India Association of the Triad • NSF- NIRT, "Nanomaterials and Superconducting Phenomena," 2006	• Treasurer (Conducted balance sheet transactions & fund raising events) • Conducted modules for high school students

	• Engineering Starters Program • NSF-Nanoscale Science and Engineering Center-NanoCEMMS • Claxton Elementary School • FIRST Robotics	• Instructor • Conducted modules for high school students • Graduate student visits • Judge
Hong	• Korean First Presbyterian • Habitat for Humanity • Teen Challenge	• IT development • Volunteer • Visitation of homebound
Jiang	• PRP summer program design competition	• Judge the technical competition
Mountjoy	• Multiple Area High Schools • Multiple Area High Schools • Moss Street Elementary	• Faculty advisor for students enrolled in PRP program – introduction to IE/Human Factors, Summer 2006 • Taught six lectures on human factors/ergonomics to high school students enrolled in PIER and PRP summer education programs, and judged human factors design competition, Summer 2006 • Career exploration day
Ntuen	• NC A&T • NC A&T • Advisory Board Chair, Junior NSBE, Sandy level Community, Axon, VA • Nigerian Association in the Triad • Nigerian Sickle cell foundation • Reviewer, Ford Foundation Graduate Fellowship • Reviewer, NSF Graduate Fellowship • Nto Annang Foundation, Board Member	• K7-12 Programs: Para-Researcher Program. Summer program for K7-K12 science and mathematics, including mentorship in research. • PIER. All year research mentorship program for K9-12. • Organized fund and conducted mathematics and science fair • Secretary • Chair, Science and Medical Research Consortium, Akwa Ibom State, Nigeria • Review application and assist in evaluation • Review application and assist in evaluation • Director, culture and education for youths
Oneyear	• IIE • IIE	• Took students to annual regional conference • Coordinated visits to GE, Philip

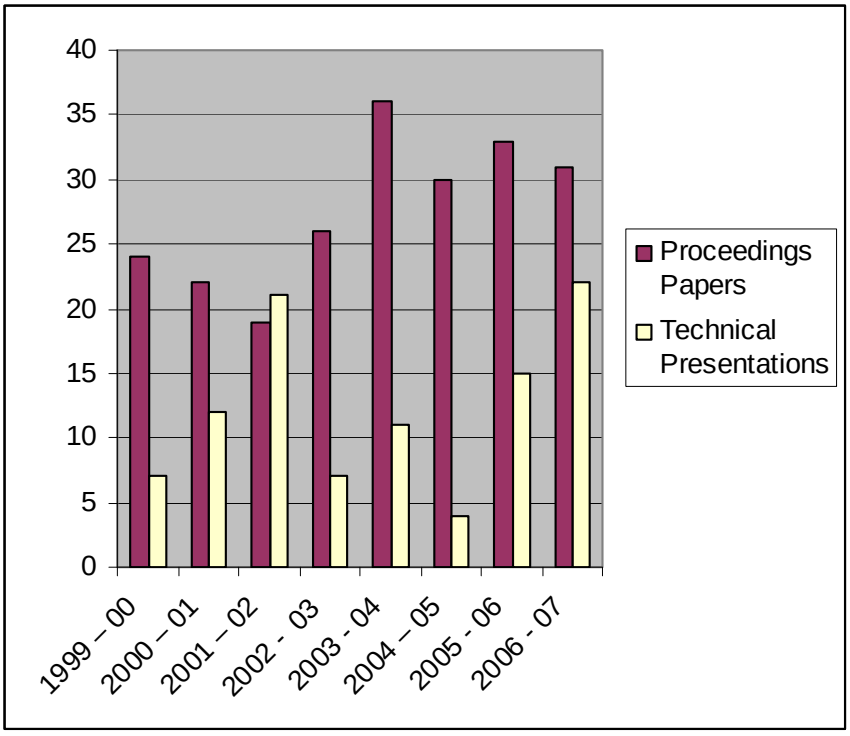
		Morris
Park	• NC A&T State • NC A&T State • Korean Language School	• K7-12 Programs: Para-Researcher Program. Summer program for K7-K12 science and mathematics, including mentorship in research. • PIER. All year research mentorship program for K9-12. • Leading Woori 2020 Program
Seong	• Summerfield Elementary • HFES	• Presentation • Food Drive
Stanfield	• Guilford County Schools • Agents of Grace	• Host of laboratory tours • Project team leader, board member
Udoka	• Action Greensboro • Guilford County Schools	• Taskforce for Attracting and Retaining Young Professionals • Judge Science Fair – Jones Elementary School

5.2.3. Other scholarly activities

5.2.3.1. Publications



5.2.3.2. Presentations



5.3. Interdisciplinary Activities

6. Analysis and Summary of Data

6.1. External Trends

The need for Industrial Engineers is rising. The discipline has experience significant growth internationally. In the US, there have been challenges because the discipline is not well-understood. With trends of globalization and complexification, the need for the skill set of Industrial Engineers is expected to grow.

6.2. Department/Program Strengths

From a strategic faculty meeting in the 2006-2007 school year, the following strengths and weaknesses were identified.

Strengths
The strength of the department is its faculty members. All of the faculty members are professionals and fully dedicated to their teaching, research and service even though their work loads are high compared with other schools. Some of the supporting indicators are:

1. Students' teaching evaluations have been well marked (4.3 out of 5 for last semester).
2. All of them have actively participated in updating department curriculum and conducting self-assessment for their courses' learning objectives regularly.
3. All of the faculty members have actively participated in funded research and technical paper publications. According to the latest survey, the department was ranked # 8 in the nation in terms of research dollar per faculty.
4. They recognize the university missions as a land grant university, so all of them have actively participated in providing technical support for local economic development.
5. All of the faculty members maintain an open door policy for students.

Weaknesses
The greatest weaknesses are caused by the current limited resources provided by the university as a result of state budget deficit, which has decreased funding to the public universities. As the department offers graduate programs (MS and Ph.D.) with only an undergraduate budget and environment, the department suffers in many ways including excessive faculty workloads, lack of laboratory technician support and lack of funding for graduate students. For example, based on the General Administration SCH funding model, the department generated more than twice its allocated positions

Other area considered were:
Staff:

- Good things: Cohesive group, friendly environment,
- Needs improvement: well defined structure, workload and pay

Undergrad:

- Good things: faculty care, job market, co-op experience, small classes, nurturing
- Needs of improvement: faculty accessibility, structure exams, laboratories.

Grad:
- Good thing: Easy money, program is accessible,
- Needs of improvement: misunderstanding or unclear feeling on PSE v/s MSE, limited course offering, lab space, study area

Corporate Partners:
- Good thing: None
- Needs of improvement: needs to have two way interaction, sell-short

State of NC:
- Good thing: No. 1 producer of minority students in nation, draws SCH
- Needs of improvement: retention and graduation rates to improve

Research Sponsors:
- Good thing: African American graduate students
- Needs of improvement: agency deliverables

Recruiters:
- Good thing: No. 1 producer of minority students in nation, good social skills
- Needs of improvement: no tying with department and career service, develop relationship with companies, student should show up for interviews, co-op opportunities to be extended to all students

6.3. Departmental Challenges

From the strategy meeting:
- Foreseeable threats to ISE dept
  - Competing programs within the university (General Engineering & Leadership Program) in addition to eroding of major content within the University studies curriculum
  - IIE (national and local chapters collapsing)
  - Minimum admission standards too low
- Recommendations and solutions
  - Differentiate ISE based on core strengths
  - Marketing
  - Include globalization component
  - Look at stable funding sources over 3 years and above
- Other relevant comments
  - Math and computer programming competence are key
  - Ensure consistency while awarding scholarship and financial aid
  - Instill a culture within students to earn their degrees

6.4. Enrollment Trends

The need for Industrial Engineers is rising. The discipline has experience significant growth internationally. In the US, there have been challenges because the discipline is not well-understood. With trends of globalization and complexification, the need for the skill set of Industrial Engineers is expected to grow.

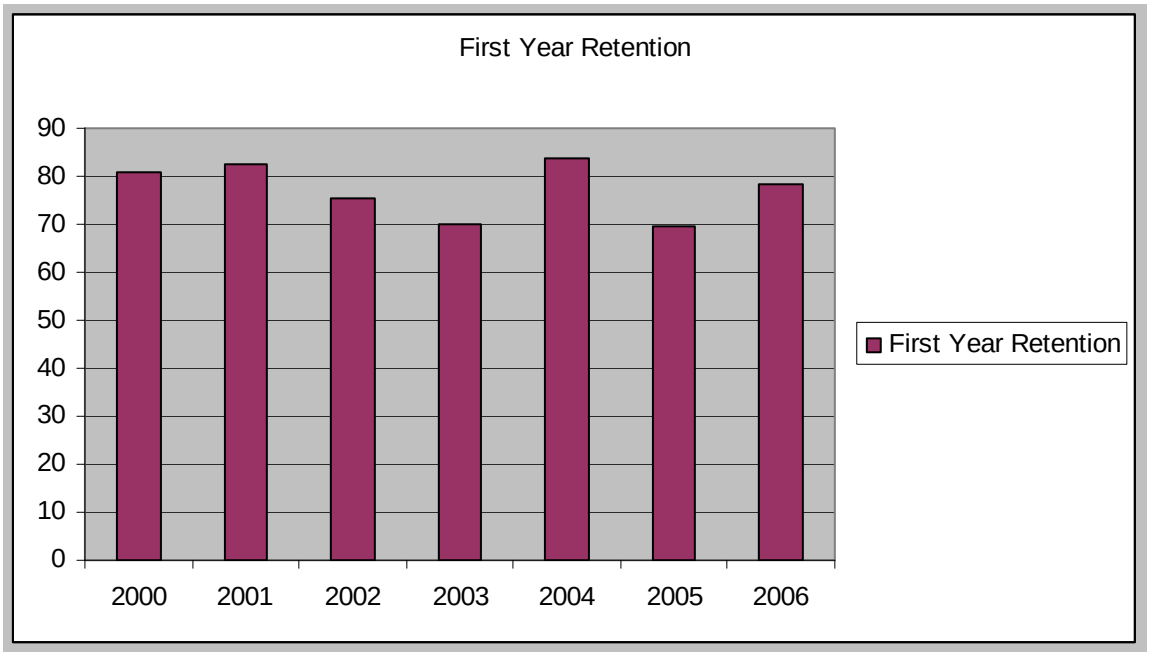
Enrollment at NC A&T State is difficult to analyze because many students were administratively placed in Industrial Engineering yet were pursuing other majors. Actual enrollment of those desiring Industrial Engineering has grown to be about 180.

It is expected that Undergraduate Enrollment will be a future challenge with the department opportunity to compensate by growing the graduate program.

6.5. Retention Trends

The Department of Industrial and Systems Engineering has had consistent, and relatively high retention. Note that the lower retention rate for those entering in 2005 was connected to administrative admission of students into IE major who were intended on pursuing other routes.

The Department of Industrial and Systems Engineering has been very progressive in the development of programs to retain students and has been an example for other departments.



7. Bachelor of Science Program Assessment

Department of Industrial and Systems Engineering
North Carolina A&T State University

7.1. FORM A Bachelor of Science

Department Name: Industrial and Systems Engineering
Program Name: Bachelor of Science in Industrial Engineering

1. Undergraduate Learning Outcome Goals

The specific program objectives, measured in terms of the capabilities graduates of the BSIE program are expected to possess are given below.

1. Perform both technically / professionally for a variety of employers in the manufacturing and service industries.
2. Use information technology tools and systems engineering methods.
3. Function in interdisciplinary, culturally and/or globally diverse teams.
4. Contribute to their communities, the profession of industrial engineering, and the University and its constituents.
5. Engage in proactive, continuous, and life long learning including the pursuit of graduate studies.

The specific program outcomes, measured in terms of the knowledge and skills the graduates of the BSIE program are expected to possess upon graduation are given below. These outcome goals are driven by the Industrial Engineering Program Advisory Council and ABET requirements.

Outcome No.	*Description*
1	Apply knowledge of mathematics
2	Apply knowledge of basic sciences
3	Apply knowledge of engineering sciences
4	Apply knowledge of industrial engineering theory
5	Design experiments and collect data from a variety of sources
6	Analyze and interpret data
7	Formulate and solve engineering problems
8	Design or improve integrated systems consisting of people, materials, information, equipment and energy considering life cycle factors
9	Utilize tools of information technology
10	Employ project management skills
11	Gain industrial experience
12	Appreciate role of ethics and engineering law
13	Preserve and enhance the engineering profession
14	Recognize global environmental, economic and societal issues
15	Describe role of life long learning in career plan
16	Ability to work in multidisciplinary teams
17	Communicate effectively

2. List of Other Program Outcomes Not Included in Strategic Plan

In addition to the educational outcomes above, the following outcomes are used for program assessment and improvement.

Other Outcome No.	*Description*
O1	Number of graduates receiving job offers within one month of graduation
O2	Starting salaries offered to graduates of the program
O3	Variety of organizations offering jobs to graduates
O4	Satisfactory evaluation of ABET Self-Study by the program faculty
O5	Satisfactory evaluation of ABET Self-Study report and site visit by ABET Evaluators
O6	Satisfactory evaluation of SACS Self-Study by program faculty
O7	Satisfactory evaluation of SACS Self-Study by SACS Evaluators
O8	Number of projects initiated with local industry
O9	Number of projects completed successfully for local industry
O10	Number of workshops and seminars organized for local industry
O11	Number of students entering graduate school
O12	Number of faculty members who are active members of professional societies
O13	Number of faculty members in leadership roles in professional societies

Note: Some of the other outcomes might be considered measurements. These are stated here as outcomes to remain consistent with their use in the ABET process. Outcomes O4-O7 and O12-O13 are evaluated directly rather than using the methods on Form C.

7.2. FORM B Bachelor of Science

Department Name: Industrial and Systems Engineering
Program Name: Bachelor of Science in Industrial Engineering

II Evaluation Methods

Method	Use
Fundamentals of Engineering exam	Used to identify general and industrial engineering subject area where deficiency

Note: The program has not historically used any commercially available evaluation methods as part of its formal assessment process. Increasingly, students are encouraged to take the FE exam and subject area results will be reviewed to help indicate areas requiring program improvement.

FORM C: Bachelor of Science

Department Name: Industrial and Systems Engineering
Program Name: Bachelor of Science in Industrial Engineering

III. List of Evaluation Methods

Several different evaluation methods are used to evaluate ISE program objectives and outcomes. The extent to which objectives are being achieved is primarily monitored by input from alumni surveys, engineering advisory board activities, relationships maintained with employers, and by studying the outcomes assessment data summaries. The following table summarizes the main outcomes assessment instruments that are used along with their schedule.

ISE Program Assessment Instruments

No.	Assessment Instrument	Schedule	Frequency
1	Database Outcome Index	Across curriculum	Every three years
2	Senior Design Project Rating	Senior Year	Every semester
3	Sophomore Assessment Test (INEN 289)	Sophomore Year	Every year
4	Junior Assessment Test (INEN 389)	Junior Year	Every year
5	Senior Assessment Test (INEN 489)	Senior Year	Every year
6	Senior Exit Survey	Prior to graduation	Every semester
7	Alumni Survey	2 years after graduation	Every third year

7.3. FORM D Bachelor of Science

Department Name: Industrial and Systems Engineering
Program Name: Bachelor of Science in Industrial Engineering

IV. Findings from Assessment Measures and Associated Program Changes

The ISE department has employed several different types of program assessments, and as a result, many changes were made to the undergraduate curriculum and associated course content. The results of several of these assessments are provided in the following sections.

Alumni Survey Results as Related to Program Objectives

The 2005 College of Engineering Alumni Survey was purposefully constructed to address the degree to which graduates of the various undergraduate programs are achieving their respective program objectives. Additional questions were included for ISE graduates in order to assess objectives unique to the Department of Industrial & Systems Engineering. Results from the survey are summarized below:

6. Perform both technically and professionally for a variety of employers in the manufacturing and service industries.
    - Graduates are working in a wide variety of fields including: government, construction, manufacturing, product engineering, academia and health care
    - 83% or respondents indicate their salaries are equal to or above those of their peers in similar positions
    - 83% are satisfied with their career advancement
    - 91% are satisfied with their career choice
    - 88% were employed fulltime, 8% were employed part time, and 4% were unemployed but not seeking employment

7. Use information technology tools and systems engineering methods.
    - 89% of respondents spend at least 50% of their time using IT tools at work
    - IT tools identified include: MS Office products, database, CAD/CAM, optimization, simulation, flowcharting and programming
    - 95% of respondents indicate the use of IT tools has been important in career success
    - A wide variety of systems methods are being used by ISE graduates including: six sigma, lean manufacturing, total quality management, data modeling, process modeling, and time study/predetermined time systems

8. Function in interdisciplinary, culturally and/or globally diverse teams.
    - 100% indicate the ability to work in teams is important
    - 92% indicate teamwork is a job requirement
    - 80% spend at least 25% of their time in teams
    - 52% spend at least half of their teamwork time as team leaders, 81% spend at least a quarter of their time leading teams

- 58% of respondents time in teams is interdisciplinary in nature

9. Contribute to their communities, the profession of industrial engineering, and the University and its constituents.
    - 63% have taken on some type of leadership role in a professional society
    - 71% have filled a leadership role in a community organization
    - 52% have volunteered time in K-12 activities
    - 76% have encouraged students to attend NCA&T
    - 52% have helped recruit A&T graduates as employees
    - 36% have given back financially to NCA&T
    - 24% have served on an advisory board at NCA&T
    - 20% have come back to speak to students at NCA&T
    - 32% were members of the alumni association

10. Engage in proactive, continuous, and life long learning including the pursuit of graduate studies.
    - 42% have participated in conferences at the local, state or regional level
    - 35% have participated in a national conference since graduation
    - 50% have completed special training for certification
    - 20% had taken and passed the FE exam

7.3.1. Outcome Summary and Results

Below are summarized results of assessment instruments organized by outcome and assessment metric. Data for Course Database Index, Senior Design Project, and Course Learning Objective Surveys is a weighted average for three semesters from Spring 2006 to Spring 2007. Earlier Course Learning Objective Survey information and Senior Design Project evaluation is also available. Data for the FE and FE styles exams is for the most recent three years.

Outcome 1: Apply knowledge of mathematics

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	84.3%	75%	YES
INEN 289 Differential Calculus Test	60.1%	42%	YES
INEN 389 Integral Calculus Test	63.0%	42%	YES
INEN 389 Statistics Test	63.0%	42%	YES
FE General Statistics Questions **	62.0%	51%	YES
FE General Math Questions	53.0%	38%	YES
FE Discipline Engineering Statistics Questions	34.7%	17%	YES
Course Learning Objective Surveys	79.4%	75%	YES

Outcome 2: Apply knowledge of basic sciences

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
INEN 289 Chemistry Test	52.1%	39%	YES
INEN 389 Physics Test	49.5%	35%	YES
INEN 389 Material Science Test	68.4%	35%	YES
FE General Chemistry Questions	54.0%	34%	YES
FE General Material Science Questions	30.7%	24%	YES

Outcome 3: Apply knowledge of engineering sciences

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
FE Dynamics Questions	40.5%	25%	YES
FE General Electrical Circuits Questions	42.0%	24%	YES
FE General Fluid Mechanics Questions	39.0%	17%	YES
FE General Thermodynamics Questions	32.7%	22%	YES
FE General Mechanics Questions	38.0%	29%	YES

Outcome 4: Apply knowledge of industrial engineering theory

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	81.8%	75%	YES
INEN 389 Work Methods Test	46.1%	35%	YES
INEN 489 Human Factors Engineering	38.2%	35%	YES
INEN 489 Operations Research Test	44.5%	37%	YES
INEN 489 Quality Test	48.9%	35%	YES
FE Discipline Ergonomics Questions *	49.0%	14.2%	YES
FE Discipline Manufacturing Processes Questions *	70.5%	33.5%	YES
FE Discipline Math Optimization Questions *	53.5%	33.5%	YES
FE Discipline Statistical Quality Control Questions *	32.5%	22.7%	YES
FE Discipline Queuing Theory Questions *	44.5%	28.5%	YES
FE Discipline Work Methods Questions *	28.5%	3.2%	YES
FE Discipline Modeling and Computation **	50.0%	37%	YES
FE Discipline Human Factors, Productivity, Ergonomics and Work **	40.0%	29%	YES
FE Discipline Quality **	45%	35%	YES
Course Learning Objective Survey	81.7%	75%	YES

Outcome 5: Design experiments and collect data from a variety of sources

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	79.9%	75%	YES
Senior Design Faculty Ratings	75.0%	75%	YES
INEN 489 Design of Experiments Test	32.6%	35%	NO
FE Discipline Design of Experiments Questions *	37.0%	6%	YES
Course Learning Objective Survey	82.0%	75%	YES

Outcome 6: Analyze and interpret data

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	82.9%	75%	YES
Senior Design Faculty Ratings	71.8%	75%	NO
Course Learning Objective Survey	81.2%	75%	YES

Outcome 7: Formulate and solve engineering problems

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	80.0%	75%	YES
Senior Design Faculty Ratings	73.0%	75%	NO
INEN 489 Operations Research Test	44.5%	37%	YES
FE Discipline Math Optimization Questions *	53.5%	34%	YES
FE Discipline Queuing Theory Questions *	44.5%	15%	YES
FE Discipline Simulation Questions *	49.0%	28%	YES
FE Discipline Modeling and Computation	50.0%	37%	YES
Course Learning Objective Survey	79.3%	75%	YES

Outcome 8: Design or improve integrated systems consisting of people, materials, information, equipment and energy considering life cycle factors

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	81.6%	75%	YES
Senior Design Faculty Ratings	60.3%	75%	NO
INEN 489 Production Systems Test	41.9%	35%	YES
FE Discipline Facilities Design and Location Questions	42.7%	31%	YES
FE Discipline Industrial Management Questions	51.0%	30%	YES
FE Discipline Manufacturing Systems Questions *	46.0%	22%	YES
FE Discipline Material Handling Questions *	63.5%	29%	YES
FE Discipline Production Management Questions *	36.5%	14%	YES
FE Discipline Total Quality Management Questions *	50.5%	23%	YES
FE Discipline Manufacturing and Production Systems Questions	48.7%	28%	YES
FE Discipline Quality Questions **	45.0%	35%	YES
Course Learning Objective Survey	76.7%	75%	YES

Outcome 9: Utilize tools of information technology

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	83.6%	75%	YES
INEN 289 Computer Programming Test	54.0%	50%	YES
INEN 389 Information Technology Test	54.3%	35%	YES
FE General Computers Questions	59.3%	45%	YES
FE Discipline Computer Modeling Questions *	61.5%	28%	YES
FE Discipline Information Systems Design Questions *	33.5%	10%	YES
FE Discipline Simulation Questions *	49.0%	28%	YES
Course Learning Objective Survey	72.0%	75%	NO

Outcome 10: Employ project management skills

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	74.0%	75%	NO
Senior Design Faculty Ratings	69.3%	75%	NO
Course Learning Objective Survey	71.3%	75%	NO

Outcome 11: Gain industrial experience

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	88.0%	75%	YES
Senior Design Faculty Ratings	78.5%	75%	YES
Course Learning Objective Survey	97.0%	75%	YES

Outcome 12: Appreciate role of ethics and engineering law

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	83.2%	75%	YES
Senior Design Faculty Ratings	55.8%	75%	NO
FE General Ethics Questions	74.3%	47%	YES
Course Learning Objective Survey	83.7%	75%	YES

Outcome 13: Preserve and enhance the engineering profession

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	93.2%	75%	YES
Course Learning Objective Survey	78.0%	75%	YES

Outcome 14: Recognize global environmental, economic and societal issues

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	76.3%	75%	NO
INEN 389 Economic Justification Test	51.6%	35%	YES
INEN 489 Facilities Test	46.8%	40%	YES
FE General Engineering Economy Questions	55.0%	36%	YES
FE Discipline Industrial Cost Analysis Questions **	39.0%	16%	YES
FE Discipline Engineering Economics Questions	36.0%	14%	YES
Course Learning Objective Survey	68.7%	75%	NO

Outcome 15: Describe role of life long learning in career plan

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	72.3%	75%	NO
Course Learning Objective Survey	73.3%	75%	NO

Outcome 16: Ability to work in multidisciplinary teams

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	85.3%	75%	YES
Senior Design Faculty Ratings	73.8%	75%	NO
Course Learning Objective Survey	81.8%	75%	YES

Outcome 17: Communicate effectively

Assessment Instrument	Student Performance	Target / LCL	Target / LCL Met?
Database Index	80.0%	75%	YES
Senior Design Faculty Ratings	63.3%	75%	NO
INEN 289 Technical Writing Test	84.2%	75%	YES
Course Learning Objective Survey	74.2%	75%	NO

B.S. Program Improvement Based on Assessment Data

The table below contains a representative list of undergraduate program changes since 2001. The level of the change is indicated as university, college, program, or course as well as the date upon which the change was decided. Changes at the university and college levels were not made as part of the program continuous improvement process. These changes did tend to be outcomes-based. For the program and course changes, those that were made as part of the Outcome Assessment process or heavily influenced by that process are shown in italics.

Level	Affected Course(s)	Year	Sem	Action	Program Outcome (ABET Outcome)	Status
Program		*2006*	*F*	*Created CAP/STILT student strategy – described below*	*Multiple - 1-10, 14, 16, 17 (a-e, g, h, k)*	*In progress*
Program		*2003*	*F*	*Creation of the Active Learning in the Virtual Enterprise (ALIVE) System – described in Laboratories section of this document*	*Multiple - 4-9, 11, 14, 16, 17 (a-e, g, h, j, k)*	*In progress*
Program	*INEN 500*	*2006*	*S*	*Create list of basic take ahead skills and knowledge (TASK list) students need for success in each of our undergrad classes*	*Multiple*	*Start in Fall 07*
Program		*2001*	*F*	*Increased emphasis on teaching using learning objectives - basis for course database system which was adopted in Fall 2005*	*Multiple*	*Done*
Program		*2003*	*S*	*Generation of undergraduate course preparation checklist*	*Multiple*	*Done*
Program	MATH 121	2001	F	Freshman block scheduling	1 (a)	Done
College	MATH 131 MATH 132 MATH 231 MATH 431 INEN 270	2002	F	Minimum C requirement	1 (a)	Done
Course	INEN260	2003	F	Create new 3 credit hour course for better topic coverage and FE prep	1 (a)	Done
College	MATH131 INEN270	2003	F	Created “Supplemental Instructor” system to assist with hurdle courses	1 (a)	Done
Course	INEN501	2006	F	Developed new INEN501 class to support FE preparedness	1 (a)	Done
College	CHEM106 PHYS241 PHYS242 MEEN260	2002	F	Minimum C requirement	2 (a)	Done
College	CHEM106 PHYS241	2003	F	Created “Supplemental Instructor” system to assist with hurdle courses	2 (a)	Done
Course	INEN501	2006	F	Developed new INEN501 class to support FE preparedness	2 (a)	Done
Level	**Affected Course(s)**	**Year**	**Sem**	**Action**	**Program Outcome (ABET Outcome)**	**Status**
Course	INEN246	2002	F	Purchase videos to illustrate manufacturing processes	3 (a)	Done
College	GEEN100 MEEN313 MEEN413 ELEN440 INEN260	2002	F	Minimum C requirement	3 (a)	Done

College	ELEN440 MEEN313 MEEN413	2003	F	Included recitation section for engineering sciences classes	3 (a)	Done
Course	INEN500	2006	S	Reduce number of faculty teaching material	3 (a)	Done
Course	INEN501	2006	F	Developed new INEN501 class to support FE preparedness	3 (a)	Done
Course	INEN335	2002	S	Include coverage of decision analysis and decision trees since covered on FE	4 (a)	Done
Course	INEN389	2004	F	Change course to emphasize systems analysis techniques	4 (a)	Done
Course	INEN260	2005	F	Create new 3 credit hour Engineering Economic and Cost Analysis course for better topic coverage and FE prep	4 (a)	Done
Program		*2006*	*S*	*Outcome integration in ALIVE System*	*4 (a)*	*In progress*
Program		*2006*	*S*	*Topic assessment in ALIVE System*	*4 (a)*	*In progress*
Course	INEN501	2006	F	Developed new INEN501 class to support FE preparedness	4 (a)	Done
Course	*INEN260*	*2003*	*F*	*Use FE Style questions on exams*	*4 (a)*	*Done*
Course		*2002*	*F*	*Divided former Ergonomics class allowing more laboratory time for experimentation*	*5 (b)*	*Done*
Program		*2007*	*S*	*Creation of common laboratory format / rubric*	*5 (b)*	*In progress*
Program		*2004*	*F*	*Standardize classes using SAS statistical software*	*5 (b)*	*Done*
Course	*INEN260*	*2003*	*F*	*Create new 3 credit hour Engineering Economic and Cost Analysis course for better topic coverage and FE prep*	*6 (b)*	*Done*
Course	INEN335	2002	S	Include coverage of decision analysis and decision trees since covered on FE	7 (e)	Done
Course	INEN389	2004	F	Change course to emphasize systems analysis techniques	7 (e)	Done
Course	INEN415	2004	F	Programming and logical thinking needs to be taught and reinforced (across curriculum)	7 (e)	In progress
Course	*INEN260*	*2005*	*F*	*Create new 3 credit hour Engineering Economic and Cost Analysis course for better topic coverage and FE prep*	*7 (e)*	*Done*
Course	INEN324 INEN446	2005	F	Reorder manufacturing systems classes to allow more of a system focus in INEN446	8 (c)	Done
Course	*INEN495*	*2007*	*S*	*Creation of Senior Design templates*	*8 (c)*	*In progress*
Course	*INEN365*	*2002*	*F*	*Use AutoCAD as part of class project*	*9 (k)*	*Done*
Course	INEN415	2003	S	Recommend change to 3(2-2)	9 (k)	Done
Course	INEN415	2003	S	Recommend change to 3(2-2)	9 (k)	Done
Course	*INEN260*	*2003*	*F*	*Create new 3 credit hour course for better topic coverage and FE prep*	*9 (k)*	*Done*
Level	**Affected Course(s)**	**Year**	**Sem**	**Action**	**Program Outcome (ABET Outcome)**	**Status**
Course	*INEN365*	*2003*	*F*	*Increase emphasis on AutoCAD*	*9 (k)*	*Done*
Program		*2004*	*F*	*Skills track for design-based graphics*	*9 (k)*	*Done*
Course	*INEN324*	*2004*	*F*	*Change to SolidWorks/AutoCAD*	*9 (k)*	*Done*
Program	\	*2004*	*F*	*Skills track for computer programming*	*9 (k)*	*In progress*
Course	*INEN415*	*2004*	*F*	*Programming and logical thinking needs to be taught and reinforced (across curriculum)*	*9 (k)*	*In progress*

Course	*INEN335*	*2004*	*F*	*Programming and logical thinking needs to be taught and reinforced (across curriculum)*	*9 (k)*	
Program	INEN335	2005	S	Add programming assignment	9 (k)	Done
Course	*INEN102*	*2005*	*F*	*Increased number of contact hours for graphics class*	*9 (k)*	*Done*
Course	*GEEN162*	*2005*	*F*	*Increased number of contact hours for computer programming class*	*9 (k)*	*Done*
Course	*INEN335*	*2006*	*S*	*Look for opportunities to enhance IT/programming skills using Excel and Add-ins*	*9 (k)*	*Done*
Course	INEN365	2006	S	Evaluate LayOpt and new BlockPlan software for possible use	9 (k)	In progress
Course	INEN355	2002	S	Added project management methods to production class	10 (k)	Done
Course	INEN246	2004	F	Limit lab classes to 15 for better equipment availability	11 (j)	Done
Course	INEN446	2005	F	Create smaller lab sections in class to maximize hands-on work	11 (j)	Done
Course	INEN324	2005	F	Create smaller lab sections	11 (j)	Done
Program		*2005*	*F*	*Industry member assessment participation in ALIVE System*	*11 (j)*	*In progress*
Program		*2006*	*S*	*Authentic assessment in ALIVE System*	*11 (j)*	*In progress*
Program		2006	F	Participated in alumni mentoring electronic network	11 (j)	Done
		2006	*F*	*Create plan to formalize educational value of coops/internships*	*11 (j)*	*Start in Fall 07*
Course		*2007*	*S*	*Created Six Sigma course allowing certification*	*11 (j)*	*Done*
Program		2007	S	Industrial engineering advisory board speaking to class	11 (j)	Done
		2003	S	Adoption of the AGGIE PRIDE Compact (see details below)	12 (f)	Done
Course	GEEN110	2002	S	Created freshman colloquium course	13 (f)	Done
Program		2002	F	Increased emphasis of profession registration in course sequencing	13 (f)	Done
Course	*INEN389*	*2002*	*F*	*Require students to get FE Reference book*	*13 (f)*	*Done*
Course	*INEN260*	*2002*	*F*	*Pattern at least 50% of exam questions after FE style*	*13 (f)*	*Done*
Course	*INEN500*	*2006*	*S*	*Reduce number of faculty teaching material*	*13 (f)*	*Done*
Course	*INEN500*	*2006*	*S*	*Increase number of database questions*	*13 (f)*	*In progress*
Course	*INEN501*	*2006*	*F*	*Developed new INEN501 class to support FE preparedness*	*13 (f)*	*Done*
Course	*INEN260*	*2003*	*F*	*Create new 3 credit hour Engineering Economic and Cost Analysis course for better topic coverage and FE prep*	*14 (h)*	*Done*
Level	**Affected Course(s)**	**Year**	**Sem**	**Action**	**Program Outcome (ABET Outcome)**	**Status**
Course	INEN389	2004	F	Change course to emphasize systems analysis techniques	14 (h)	Done
University		2006	F	Creation and adoption of the University Studies general education program	14 (h)	Done
Course	*INEN495*	*2007*	*S*	*Creation of Senior Design templates*	*14 (h)*	*In progress*
University		2003	S	Adoption of the AGGIE PRIDE Compact (see details below)	15 (i)	Done

Course	*INEN335*	*2006*	*S*	*Add objective to "describe plan for life long learning to maintain quantitative analysis skills"*	*15 (i)*	*Done*
University		2006	F	Creation and adoption of the University Studies general education program	15 (i)	Done
Course		2004	F	Created class partnering relationship with business school	16 (d)	Done
Program		*2006*	*S*	*Team assessment in ALIVE System*	*16 (d)*	*In progress*
University		2006	F	Creation and adoption of the University Studies general education program	16 (d)	Done
Program		*2007*	*S*	*Creation of common teamwork rubric*	*16 (d)*	*In progress*
College		2003	F	Began college "Toastmasters" club	17 (g)	Done
Program		*2006*	*S*	*Communication assessment in ALIVE System*	*17 (g)*	*In progress*
Program		*2006*	*F*	*Established base of communication rubrics*	*17 (g)*	*In progress*
Program		*2006*	*F*	*Skills track for written communication*	*17 (g)*	*In progress*
Program		*2007*	*S*	*Creation of departmental version of writing "toastmasters"*	*17 (g)*	*In progress*
Course	INEN495	2004	F	Recommend all faculty serve on course committee	Other	Done
Course	INEN495	2006	S	Add prerequisites to ensure student preparedness	Other	Done

8. Master's of Science Program Assessment

Department of Industrial and Systems Engineering
North Carolina A&T State University

Graduate programs (MS and Ph.D.) have not been as formally organized in terms of standard learning expectations as the undergraduate program. In general terms, class assignments and projects are made in broad terms, permitting the student to exercise some self-direction in study. Students are expected to mature in initiative, judgment, and technical ability. When participating in classes with undergraduates, graduates are held to a higher standard in terms of depth and quality of work. This pattern is consistent with all other engineering schools.

8.1. FORM A: Master's of Science

Department Name: Industrial and Systems Engineering
Program Name: Master's of Science in Industrial Engineering

1. Master's Learning Outcome Goals

The specific program objectives, measured in terms of the capabilities graduates of the MSIE program are expected to possess are given below.

1. Perform both technically / professionally for a variety of employers in the manufacturing and service industries.
2. Use analytical and computational tools effectively for system design and improvement.
3. Function in interdisciplinary, culturally and/or globally diverse teams.
4. Effectively teach and/or conduct quality research in traditional or emerging field of industrial engineering.
5. Engage in proactive, continuous, and life long learning including the pursuit of Ph.D. studies.

8.2. FORM B: Master's of Science

Department Name: Industrial and Systems Engineering
Program Name: Master's of Science in Industrial Engineering

II Evaluation Methods

No commercial test or national exams are currently being used. There are no plans to at this time to use such exams.

FORM C: Master's of Science

Department Name: Industrial and Systems Engineering
Program Name: Master's of Science in Industrial Engineering

III. List of Evaluation Methods

Several different evaluation methods are used to evaluate ISE program objectives and outcomes. The extent to which objectives are being achieved is primarily monitored by input from alumni surveys, engineering advisory board activities, relationships maintained with employers, and by studying the outcomes assessment data summaries. The following table summarizes the main outcomes assessment instruments that are used along with their schedule.

ISE Program Assessment Instruments

No.	Assessment Instrument	Schedule	Frequency
1	Supervised Teaching/Research	Each Semeater	Every semester
2	Thesis/Project Proposal	Final Year	As needed
3	Thesis/Project Defense	Prior to graduation	As needed
4	Course Only Comprehensive Exam	Prior to graduation	As needed

Other Metrics for Evaluating Objectives

1. Master's Job Placement Information
2. Measured by Assessment Instruments
3. Student Body Demographics, Number of Team Activities
4. Number of Student-Involved Research Papers, Assistant Evaluations, Assistantship Proportion
5. Number Entering Ph.D. Programs
6. Percentage Successfully Completing Master's Degree

8.3. FORM D: Master's of Science

Department Name: Industrial and Systems Engineering
Program Name: Master's of Science in Industrial Engineering

Program changes for the Master's Program which resulted from analysis of assessment instruments include:

1. Establishment of Supervised Research and Supervised Teaching course which provides direction in both areas and requires monthly progress presentations.
2. Combination of Management Systems and Production Systems Tracks to allow greater student flexibility and feeling of belonging.
3. Creation of specialty areas in Healthcare Engineering and Advanced Manufacturing to meet student demand and growing research areas.
4. Increased emphasis on need to submit research to journals for publication in order that it might be validated in the discipline.
5. Addition of course work in Six Sigma Quality and Engineering Entrepreneurship.

9. Doctor of Philosphy Program Assessment

Department of Industrial and Systems Engineering
North Carolina A&T State University

Graduate programs (MS and Ph.D.) have not been as formally organized in terms of standard learning expectations as the undergraduate program. In general terms, class assignments and projects are made in broad terms, permitting the student to exercise some self-direction in study. Students are expected to mature in initiative, judgment, and technical ability. When participating in classes with undergraduates, graduates are held to a higher standard in terms of depth and quality of work. This pattern is consistent with all other engineering schools.

9.1. FORM A: Doctor of Philosophy

Department Name: Industrial and Systems Engineering
Program Name: Doctor of Philosophy in Industrial Engineering

1. Ph.D. Learning Outcome Goals

The specific program objectives, measured in terms of the capabilities graduates of the MSIE program are expected to possess are given below.

1. Perform both technically / professionally for a variety of employers in the academic, industry, and government sectors.
2. Use analytical and computational tools effectively for system design and improvement.
3. Function in interdisciplinary, culturally and/or globally diverse teams.
4. Effectively teach and conduct publishable research in traditional or emerging field of industrial engineering.
5. Engage in proactive, continuous, and life long learning.

9.2. FORM B: Doctor of Philosophy

Department Name: Industrial and Systems Engineering
Program Name: Doctor of Philosophy in Industrial Engineering

II Evaluation Methods

No commercial test or national exams are currently being used. There are no plans to at this time to use such exams.

FORM C: Doctor of Philosophy

Department Name: Industrial and Systems Engineering
Program Name: Doctor of Philosophy in Industrial Engineering

III. List of Evaluation Methods

No.	Assessment Instrument	Schedule	Frequency
1	Supervised Teaching/Research	Each Semeater	Every semester
2	Qualifying Exam	Second Year	Every semester
3	Preliminary Exam	Third Year	As needed
4	Dissertation Proposal	Final Year	As needed
5	Dissertation Defense	Prior to graduation	As needed

Other Metrics for Evaluating Objectives

1. \Job Placement Information (including Academic)
2. Measured by Assessment Instruments
3. Student Body Demographics, Number of Team Activities
4. Number of Student-Involved Research Papers, Assistant Evaluations, Assistantship Proportion
5. Percentage Successfully Completing Degree

9.3. FORM D: Doctor of Philosophy

Department Name: Industrial and Systems Engineering
Program Name: Doctor of Philosophy in Industrial Engineering

Program changes for the Doctoral Program which resulted from analysis of assessment instruments include:

1. Modification of the Preliminary Exam format to allow commencement of Dissertation course work prior to oral proposal.
2. Establishment of Supervised Research and Supervised Teaching course which provides direction in both areas and requires monthly progress presentations.
3. Combination of Management Systems and Production Systems Tracks to allow greater student flexibility and feeling of belonging.
4. Creation of specialty areas in Healthcare Engineering and Advanced Manufacturing to meet student demand and growing research areas.
5. Increased emphasis on need to submit research to journals for publication in order that it might be validated in the discipline.
6. Addition of coursework in Nano/Bio/Micro Engineering, Service Engineering, and Human Factors Engineering.
7. Modification of admission standard to better enable direct track admission for highly qualified students.