

ABET
Self-Study Report
for the
Bachelor of Science in Industrial Engineering
at
Texas A&M University-Commerce
Commerce, Texas

July 1, 2011

CONFIDENTIAL

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**Self-Study Report for the Bachelor of Science in Industrial Engineering
Texas A&M University-Commerce**

BACKGROUND INFORMATION

A. Contact Information

Primary pre-visit contact for the program:

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B. Program History

Building upon a successful Industrial Technology program over more than 20 years, Texas A&M University-Commerce (A&M-Commerce) received Texas Higher Education Coordinating Board (THECB) approval for a Bachelor of Science in Industrial Engineering in October 2011. The program was implemented in Fall 2002. The last ABET general review was conducted in October 2005.

On June 1, 2011, A&M-Commerce established two new colleges, the College of Science, Engineering, & Agriculture, and the College of Humanities, Social Sciences, & Arts. The Industrial Engineering program is part of the new College of Science, Engineering, & Agriculture. Prior to June 1, 2011, the Industrial Engineering program was housed in the College of Business & Technology. The new administrative structure better aligns programs and expertise, which should result in synergistic partnerships among the Science, Technology, Engineering, and Mathematics (STEM) program areas.

A&M-Commerce received THECB approval on January 28, 2010 and Southern Association of Colleges and Schools (SACS) approval on October 8, 2010 for a new Construction Engineering degree. Full implementation of the new Construction Engineering program occurred in the Spring 2011 semester. The department name, Industrial Engineering & Technology, no longer accurately reflected the department. A&M-Commerce sought and received THECB approval to change name to Department of Engineering & Technology. Approval was received May 23, 2011 and takes effect September 1, 2011.

Key changes to administration, faculty, and staff since the last ABET general review are summarized in Table 1.

Table 1: Key Administrative and Faculty Changes since the Last ABET General Review

Institutional Administration	Change
Dr. Keith McFarland	Retired as President
Dr. Dan Jones	President, Current
Dr. Joyce A. Scott	Provost & VP for Academic & Student Affairs
Dr. Frank Ashley	Provost & VP for Academic & Student Affairs
Dr. Mary Hendrix	Interim Provost & VP for Academic & Student Affairs, Vice President for Student Access & Success, Current
Dr. Gary Peer	Interim Provost & VP for Academic Affairs,
Dr. Larry Lemanski	Provost & VP for Academic Affairs, Current
Mr. Randy VanDeven	Vice President of Institutional Advancement, Current
College Administration	
Dr. Harold Langford	Dean, College of Business & Technology, through May 2011
Dr. Jerry Parish	Interim Dean, College of Science, Engineering, & Agriculture, June 2011 - Present
Department Administration	
Dr. J.K. Crain	Department Head, August 2003 – August 2007, Retired
Dr. Ben Cranor	Interim Department Head, August 2007 – December 2008
Dr. Brent Donham	Department Head & Associate Professor, January 2009 - Present
IE Faculty	
Dr. Pelin Altintas-Deleon	Assistant Professor, March 2011 – Present
Dr. Matthew Elam	Associate Professor, September 2007 – Present
Dr. Delbert Horton	Assistant Professor, August 2002 - Present
Dr. Andrew Jackson	Professor, January 2003 – May 2006 Department Head, East Carolina University, 2006
Dr. Mary Johnson	Assistant Professor, July 2004 – May 2007 Associate Professor, Purdue University, 2007
Dr. Sukwon Kim	Assistant Professor, September 2007 – March 2011 Accepted a new appointment at a Korean University, 2011
Departmental Staff	
Ms. Peggy Borchardt	Engineering Mentor & Transfer Liaison, February 2010 - Present
Mr. Perry Moler	Safety Officer & Technology Assistant, September 1 - Present

C. Options

The Industrial Engineering program does not have any options, tracks, or concentrations. Industrial Engineering students are encouraged to pursue a Mathematics Second Major.

D. Organizational Structure

Texas A&M University-Commerce is the fifth oldest state university in Texas. A&M-Commerce became a member of the Texas A&M University System in 1996. The university offers more than 100 major areas of study at the undergraduate and graduate levels. Located in Commerce, the university serves a region in Northeast Texas, which is bordered by Oklahoma to the north, Arkansas and Louisiana to the east, and the Dallas-Fort Worth (DFW) metroplex to the west. Approximately 89% of the TAMU-C student body comes from a 38-county area in East and Northeast Texas.



The Industrial Engineering program is housed under the Department of Engineering & Technology. The Department is one of eight departments under the College of Science, Engineering, and Agriculture. Figures 1-4 show the organizational structure for the Industrial Engineering degree program.

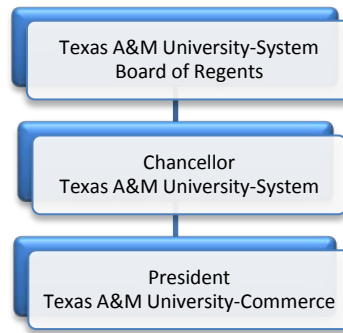


Figure 1: Texas A&M University-System/Texas A&M University-Commerce Organizational Structure

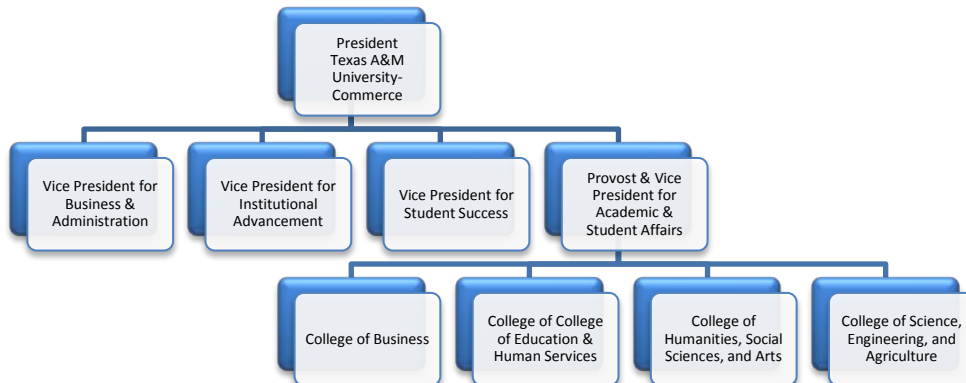


Figure 2: University Organizational Structure

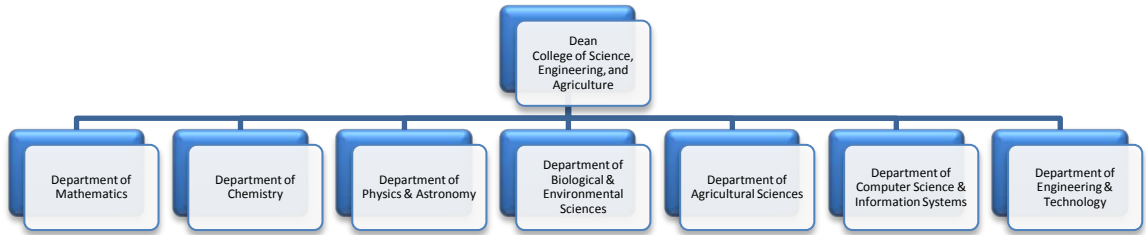


Figure 3: College of Science, Engineering, & Agriculture Organizational Structure

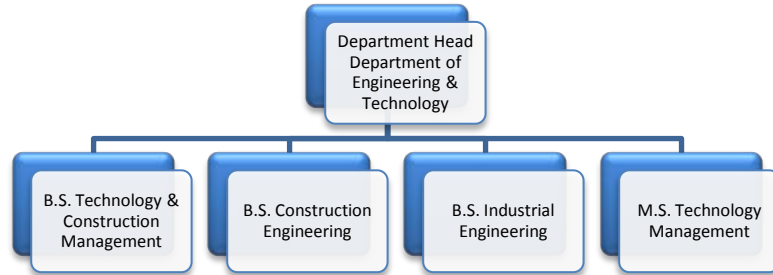


Figure 4: Department of Engineering & Technology Organizational Structure

E. Program Delivery Modes

The Industrial Engineering degree program is offered on-campus in a traditional lecture/laboratory format. Only one departmental course in the Industrial Engineering curriculum is offered in an online format. The university utilizes the eCollege platform for online delivery. eCollege is a comprehensive online learning management system. Features of eCollege can and are used to enhance face-to-face instruction. While the university offers some of the general education, or university studies, courses in an online format, with the exception of the one departmental course, students can complete the entire degree in an on-campus face-to-face format.

A majority of the industrial engineering courses are offered in the morning or afternoon. Two of the departmental freshman courses are offered in the evening to try and minimize the number of schedule conflicts with the required university studies courses students are required to take during their freshman year. Currently no weekend courses are offered.

F. Program Locations

A&M-Commerce’s main campus is located in Commerce, Texas, which is approximately 50 miles northeast from Dallas, Texas. In addition, the university has teaching sites in McKinney, Rockwall, Mesquite, Corsicana, Midlothian, and Dallas. Industrial engineering courses are only offered on the main campus.

To meet the escalating need for engineering graduates, recruiting efforts have to reach qualified students beyond the pool of college-ready high school graduates who have chosen to pursue a career in an engineering field. Relying solely on a “traditional” recruitment model will exclude a large cohort of students who have the ability and

initiative to be successful, but not necessarily the resources or the geographical flexibility to pursue an engineering degree at a flagship institution. There are over 140,000 students in community and/or junior colleges in the A&M-Commerce service area. Based upon data from the university's Institutional Research department, 72% of the students coming to A&M-Commerce have transfer credits from a community/junior college. Every public college and university in Texas is required by law to have a core curriculum of at least 42 credit hours. The intent of the core is to provide a set of courses common to any baccalaureate degree. Core curricula are designed to offer students flexibility in selecting courses that align with their individual educational goals. However, courses that satisfy the core requirements do not necessarily satisfy the degree requirements for a specific major. For example, students can be a "core completer" with College Algebra, which will not apply towards an engineering degree. Experiences at TAMU-C have shown that these students often elect to pursue another major that allows the transfer of all their core credits. To address this growing issue, the Department of Engineering & Technology developed innovative 2+2 transfer agreements with partner 2-year institutions. Students who follow and successfully complete the courses in the 2+2 agreement, not only become core completers but also gain assurance their courses will transfer seamlessly into the industrial engineering program.

G. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Actions Taken to Address Them

The most recent ABET Final Statement was received as an attachment with a letter dated July 27, 2010 from Douglas R. Bowman, Chair Engineering Accreditation Commission. The only remaining issue is a "concern" related to Criterion 2. This had been cited as a "weakness" but was upgraded to a "concern" in the most recent Final Statement based upon the department's action documented in the 2009 Interim Report and Due Process response.

The review team cited the following program weakness during the 2007 interim visit:

Criterion 2. Program Educational Objectives

The final statement for the 2005-2006 new program review noted that there has been only limited attempts to implement the program's process for evaluation of the program educational objectives, and that the program had not fully demonstrated that the graduates had attained the objectives. It was acknowledged that since this was a new program, there were few graduates who had more than two years of experience beyond graduation. The final state from the 2007-08 interim visit stated that although the program had obtained data via an alumni survey in spring 2007, they had not yet analyzed and responded to the data. They had also experienced difficulties in obtaining assessment data on their graduates from their industrial constituents. Therefore, the program had still not demonstrated an effective process for the ongoing evaluation of the extent to which their objectives are being attained, and they had not yet used the results to develop and improve the program outcomes so that graduates are better prepared to attain the objectives.

A PEO assessment process was established and documented in the 2005-2006 review procedures. Based upon the original process, attainment of the PEOs would be primarily evidenced by the results of an alumni and employer survey. The effectiveness of the process was initially impacted by 1) the Industrial Engineering program being new and having a small number of graduates, 2) difficulty in obtaining assessment data on graduates from employers due to legal and privacy issues, and 3) the resignation of two founding faculty members, who received new appointments at out-of-state universities. Based upon recommendations from the Industry Advisory Board and information from ABET workshops, the current faculty reviewed, revised, and re-implemented the PEO assessment process beginning in Spring 2009. The process still utilizes alumni and employer surveys but two additional instruments have been added to strengthen and make the process more effective. A detailed description was provided to the review team in an Interim report in July 2009 and a Due Process report, submitted in November 2009, resulting in the following response from the team in the Final Statement:

“The weakness is now cited as a concern.”

The PEO assessment process is fully described in the Criterion 4 section of this document.

H. Joint Accreditation

There is not a joint accreditation by more than one commission. The Bachelor of Science in Industrial Engineering is accredited by the Engineering Accreditation Commission of ABET.

GENERAL CRITERIA

CRITERION 1. STUDENTS

A. Student Admissions

Prior to being admitted to the Industrial Engineering program, students must meet the minimum University admission standards. Steps to and eligibility for admission to undergraduate programs of the University, including Industrial Engineering, are detailed in the Administrative Procedures section of the undergraduate catalog. The catalog is only available in an electronic format, available at the following web site (<http://catalog.tamu-commerce.edu/index.php?catoid=14>).

1. Requirements for Undergraduate Admissions

Application for Admission. The application for admission and other necessary forms may be obtained from the Office of Undergraduate Admissions or may be filed electronically at <http://web.tamu-commerce.edu/admissions/getstarted>. The Apply Texas Application at www.applytexas.org may also be submitted.

Official Transcript. High school transcripts should show the units completed, the grades earned, student's diploma plan, the date of graduation, and the rank in class. Admissions acceptance will be tentatively granted on the basis of the completion of junior year.

An applicant who attended another academic institution or any institution for vocational or advanced education, if only for a short period of time, must include this work as a part of the admission application information.

Admission Test Results. All applicants for admission who have passed fewer than 21 semester hours of transferable academic work must submit scores from either the American College Test (ACT) or the College Entrance Examination Board Scholastic Aptitude Test (SAT). The A&M-Commerce code for ACT is 4088 and the A&M-Commerce code for SAT is 6188.

Social Security Number/Campus Wide ID Number (CWID). A new campus wide ID number is now used as a permanent student identification number. The campus wide ID number is generated for all students admitted to the University. Campus Wide ID numbers are specific to Texas A&M University-Commerce Students will be assigned a CWID when they submit an official document or application for admission. Social Security numbers will continue to be printed on transcripts as a means of identifying students. Application for Social Security numbers may be obtained from any post office.

Application Deadlines. A&M-Commerce application dates are as follows:

Fall Priority Deadline	March 1
Fall Final Deadline	August 1
Spring Priority Deadline	November 1
Spring Final Deadline	December 1
Summer I Priority Deadline	April 1
Summer I Final Deadline	May 1
Summer II Priority Deadline	April 1
Summer II Final Deadline	June 1

Students may review the status of applications by using the myLeo system (myLeo is the University's student account management system).

2. Freshman Admission Requirements

First time freshmen may be admitted to Texas A&M University-Commerce by one of the following ways:

- First time freshmen who graduate in the top 25% of their graduating class from an *accredited* public or private high school in Texas are automatically admitted, but must submit ACT or SAT scores. To qualify for this automatic admission, high school graduation must be in one of the two years preceding the academic year for which the applicant is applying.
- First time freshmen who have an SAT combined critical reading and math score of 950 or higher.
- First time freshmen who score a minimum of 20 ACT or higher.

Exceptional application categories include:

- First time freshmen applicants possessing the GED will be considered for admission only after their senior high school class graduates and they have reached the age of 18. A minimum of 20 ACT or 950 SAT (combined Critical Reading and Math) is required for admission.
- First time freshmen applicants graduating from a nonaccredited school will be required to achieve a minimum score of 20 ACT or 950 SAT (combined Critical Reading and Math).
- First time freshmen who are home schooled will be required to achieve a minimum score of 20 ACT or 950 SAT (combined Critical Reading and Math).
- First time freshmen whose high school graduation is more than five years preceding the academic year for which they are applying, will be required to submit a satisfactory score of 14 on the Reading Comprehension Test of the American College

Testing program (ACT), administered by the Office of Testing and Evaluation Services at Texas A&M University-Commerce. Students in this five-year category may also submit satisfactory scores from an ACT/SAT test administered within the last five years.

Applicants who do not meet automatic admission requirements based on ranking and/or SAT/ACT scores will be reviewed by the university's Admission Committee. The committee will consider other factors including academic performance in the high school, socioeconomic status, extracurricular involvement, and performance level of high school/district or any other information that might be helpful. To be reviewed by the Admissions Committee the applicant should submit a personal statement and at least two letters of recommendation. Information should be sent to the Director of Undergraduate Admissions.

3. Department of Engineering & Technology Admission Requirements

Programs under the Department of Engineering & Technology, including the Industrial Engineering program, do not have any requirements for being admitted to the program beyond the criteria established by the University. However, there are program specific requirements for full participation in the Industrial Engineering program, which are specified in the undergraduate catalog (http://catalog.tamu-commerce.edu/preview_entity.php?catoid=14&ent_oid=329&returnto=511) and department web page (www.tamu-commerce.edu/iet). These requirements include:

- Engineering & Technology majors are required to complete the University Studies requirements and major area requirements.
- A grade of "C" or better is required in all Engineering & Technology major courses. Courses must be repeated if a grade of "C" or better is not earned in the course.

In addition, industrial engineering courses have prerequisites and/or corequisites that students must satisfy before they are allowed to register for courses in the major.

4. Undergraduate Admissions Application Process

The undergraduate admissions application process is outlined on the following Admissions Office web page: (<http://web.tamu-commerce.edu/admissions/stepsToApplyUndergraduate/default.aspx>).

The application process steps include:

- Apply online by completing the ApplyTexas Application at www.applytexas.org and list A&M-Commerce as a recipient. The ApplyTexas application is used to apply to any public 2-year or 4-year institution in the state of Texas. A non-refundable \$40 enrollment fee is charged to the student's account upon enrollment in the first semester at A&M-Commerce. This fee is applied to all undergraduate applicants (freshmen, transfers, and readmits).

- Send official high school transcripts or GED scores, and an official copy of your SAT or ACT test scores to the Admissions Office at A&M-Commerce.
- After being accepted, attend a mandatory two-day orientation session. The orientation sessions offer students the opportunity to 1) meet with the success coaches (freshman advisors), 2) register for classes, 3) acquire a student ID, 4) pay tuition and fees, and 5) learn about student services and resources.

The Department of Engineering & Technology seeks to actively engage each incoming freshman during their orientation. Students are introduced to and meet with the department's engineering mentor/transfer liaison, Department Head, and/or faculty advisors during a breakfast hosted by the College of Science, Engineering, and Agriculture. Students are provided with a copy of the degree plan and advised on what courses they should take prior to meeting with their success coaches to register for courses. As needed, the faculty advisors and/or Department Head meet with the success coach and student during the registration session at the orientation to resolve any issues regarding courses in the degree.

It should be noted that in many cases, students attending the orientations have been contacted by the engineering mentor/transfer liaison and/or faculty prior to the orientation. The department developed and has implemented a systematic process for contacting potential students who have expressed interest in engineering.

B. Evaluating Student Performance

Student success is an integral part of the fabric of the A&M-Commerce. The following guiding principle speaks to the commitment of A&M-Commerce to student success.

Student Success: Pursue and implement effective, research-based strategies that provide all students the resources, support, and high-quality instruction they need to achieve their goal of earning a college degree.

Student's academic performance and process is monitored at the university, college, and department levels. The synergistic approach is designed to give the student the services, support, and resources needed to reach their academic goals.

1. University

The **Student Access and Success One Stop Center** was created to better serve students by providing as many resources as possible in one location. Resources include, but are not limited to, 1) tutoring services, 2) career development, 3) counseling center, 4) child care, and 5) international student services. In addition to support services, the university has established a process to monitor student progress and intercede, when possible, to ensure student success.

The **University College** was established to provide students access to guidance and services necessary to be successful at A&M-Commerce. Regardless of their major, students belong to the University College until they complete their first academic year at

A&M-Commerce, complete 24 semester hours of college credit courses, complete the University's basic skills requirements, and declare a major. While they are in the University College, students are assigned a **Success Coach**. Success Coaches serve as academic advisors, as well as assisting students with financial, personal, and career counseling. The goal of the University College is to assist students into college life and to provide guidance until they transition to working directly with their faculty advisor in their major.

While students are in the University College, there are a number of formative assessment points designed to trigger vital interventions to assist students with issues that affect academic performance. Prior to the semester mid-term, faculty submit names of students who are earning a grade of "D" or "F". Success Coaches contact these students to try and determine what issues are causing the poor academic performance and to take the corrective action deemed necessary to resolve and/or minimize these issues. In addition to the predetermined monitoring events, faculty can take preemptive action anytime during the semester by issuing an **Academic Alert**. When submitted, Success Coaches are alerted immediately via email, allowing the situation to be reviewed and corrective actions taken.

Other departments, such as the athletic department and Trio programs, require additional progress reports, submitted by faculty, that are over and above the University College's processes and procedures.

The **Registrar's Office** maintains student academic records in a secure student management system. Records are available to students and faculty advisors. These records are used during periodic academic reviews as a means of monitoring a student's progress and ensuring they remain on track to graduate. Upon submission of the graduation paperwork reviewed and submitted by the Department and College, the **Graduation Coordinator's Office** verifies that the student has fully satisfied all of the degree requirements.

2. College

The College of Science, Engineering, and Agriculture is involved indirectly with evaluating student performance and progress. The college administrative support staff is responsible for inputting declared majors into the student management system. College support staff also notifies department heads and/or lead faculty of students who have filed for graduation. The Dean's office reviews and processes all of the graduation checkout paperwork after it is submitted by the department.

3. Department

The Department of Engineering & Technology has the primary responsibility of evaluating engineering students' performance and progress. The department faculty and staff actively engage and monitor student performance and progress throughout the time they are in the program.

Upon declaring their major as Industrial Engineering, students are assigned to a department **faculty advisor**. For incoming freshman, they are also assigned to a university **Success Coach** as well as the department faculty advisor. The industrial engineering faculty advisor and Success Coaches work closely to ensure students are given the best opportunity to successfully complete the university studies as well as the industrial engineering degree requirements. This provides for a smooth transition when the student is transitioned into the department from the University College. For transfer students, their first contact is typically the department's **Engineering Mentor/Transfer Liaison**. In many cases, the student has worked with or has been in contact with the Transfer Liaison prior to coming to A&M-Commerce. Upon enrolling, the student is transferred to the IE faculty advisor.

Industrial engineering students meet with the IE faculty advisor face-to-face each semester to review their progress and plan course schedules for the next semester. The assumption at the time of the initial advising session, is students will successfully pass and will take the next sequenced courses. After final grades are posted at the end of the semester (Fall, Spring, and Summer), course rosters are checked for the enrolled students who did not pass the required prerequisite(s), if any. Students lacking the required prerequisites are contacted and schedules are reworked. Academic progress of each student is documented and maintained on the **IE curriculum flowchart**, provided as Attachment 1-1 at the end of this chapter. This document provides a formal record for the student and department as to the progress a student is making towards graduation.

Prior to entering their last semester, the IE faculty advisor meets with the student to review their transcript and degree evaluation/audit. If it is deemed the individual will be eligible for graduation at the end of the semester, the faculty advisor and student complete the Department of Engineering & Technology **graduation checkout form**, provided as Attachment 1-2 at the end of this chapter. The department graduation check list is the first opportunity to ensure the student has met university, college, and department graduation requirements. The student's records are then reviewed by the Department Head and then the Dean's office before it is submitted to the Graduate Coordinator in the Registrar's office.

4. Course Prerequisites

Course prerequisites are established by the program faculty as a means of ensuring students take courses in a prescribed manner, which provides the greatest opportunity for success. Course prerequisites are identified in the university catalog as well as shown graphically on the IE curriculum flowchart. The prerequisites are programmed into the degree audit system, prohibiting students from registering for courses without the required prerequisite, unless a waiver is granted from the department. Students not meeting prerequisites are not allowed to take the course unless the circumstance is beyond the student's control such as being caught in a curriculum change, in which case the faculty teaching the course and department head makes the final decision if a student is allowed to take the course.

C. Transfer Students and Transfer Courses

There are 50 public community/junior college districts in the state of Texas, with over 700,000 students according to the Texas Association of Community Colleges. A&M-Commerce actively recruits transfer students from the more than 140,000 students in community/junior colleges within the university's service area. Based upon data from the Institutional Research department at A&M-Commerce, 72% of the undergraduate students at the university entered with transfer credits from a Texas community/junior college.

Prior to being admitted to the Industrial Engineering program, transfer students must meet the minimum University admission standards. Steps to and eligibility for admission to undergraduate programs of the University, including Industrial Engineering, are detailed in the Administrative Procedures section of the undergraduate catalog. The catalog is only available in an electronic format, available at the following web site (<http://catalog.tamu-commerce.edu/index.php?catoid=14>).

1. Transfer Admissions Requirements

A transfer student is defined as a student seeking first-time admission that previously attended an accredited institution of higher learning and is eligible to return to that institution. A transfer student will have 21 or more hours (excluding developmental courses). Students with fewer than 21 hours will be considered for admission on the basis of their ACT or SAT test scores, rank in high school class, and must have a cumulative GPA of 2.0 (on a 4.0 scale) on all college work attempted.

Transfer students must meet the following requirements for admission:

- File application for admission to the Office of Undergraduate Admissions by the deadline published in the official University Calendar found in the undergraduate catalog or in the schedule of classes for each semester.
- Submit an official transcript from each institution previously attended. A transcript is considered official only if received directly from the sending institution or if hand delivered, in a sealed registrar's envelope. Transcripts should be submitted to the Office of Undergraduate Admissions.
- Have a cumulative GPA of 2.0 (on a 4.0 scale) on all college work attempted.

Students on Academic Suspension from another institution are ineligible for admission to A&M-Commerce until their designated suspension period has passed. When the period of suspension has passed, the student may be considered for admission

Students may review the status of applications by using the myLeo system (myLeo is the University's student account management system).

2. Department of Engineering & Technology Admission Requirements

Programs under the Department of Engineering & Technology, including the Industrial Engineering program, do not have any requirements for being admitted to the program beyond the criteria established by the University. However, there are program specific requirements for full participation in the Industrial Engineering program, which are specified in the undergraduate catalog and department web page.

(http://catalog.tamu-commerce.edu/preview_entity.php?catoid=14&ent_oid=329&returnto=511)

(www.tamu-commerce.edu/iet)

These requirements include:

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In addition, industrial engineering courses have prerequisites and/or corequisites that students must satisfy before they are allowed to register for courses in the major.

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(<http://web.tamu-commerce.edu/admissions/stepsToApplyUndergraduate/default.aspx>).

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- Send official college transcripts to the Admissions Office at A&M-Commerce.
- After being accepted, attend a mandatory two-day orientation session. The orientation sessions offer students the opportunity to 1) meet with the success coaches (freshman advisors), 2) register for classes, 3) acquire a student ID, 4) pay tuition and fees, and 5) learn about student services and resources.

The Department of Engineering & Technology seeks to actively engage each incoming transfer student during their orientation. Students are introduced to and meet with the department's engineering mentor/transfer liaison, Department Head, and/or faculty advisors during a breakfast hosted by the College of Science, Engineering, and Agriculture. Students are provided with a copy of the degree plan and are provided assistance to register for appropriate courses.

It should be noted that in many cases, students attending the orientations have been contacted by the engineering mentor/transfer liaison and/or faculty prior to the orientation. The department developed and has implemented a systematic process for contacting potential students who have expressed interest in engineering.

4. Transfer Credit

A&M-Commerce accepts transfer credit from regionally accredited institutions on course by course basis. The **Office of Undergraduate Admissions** reviews transfer courses for content, level, and credit hours. Information regarding transfer credit is outlined on the Admissions Office web page at:

<http://web.tamu-commerce.edu/admissions/transferAdmissions/default.aspx>

Transfer credit is posted to a student's record under the following prescribed conditions:

- Junior/community college courses transfer as lower-division (freshman or sophomore) credit. While all transfer credit hours will be evaluated and posted to the student's academic record a maximum of 66 semester hours from a junior/community college will transfer.
- Courses from senior institutions transfer at the same level as they were taken. A minimum of 60 hours must be completed at A&M-Commerce or another senior institution. For degree completion at least 25% of the degree credit hours must be earned through A&M-Commerce and 24 of the final 30 hours must be completed in residence.
- If a transfer course is determined to be equivalent to an internal course, the equivalent A&M-Commerce course number is posted on the student's academic record.
- Transfer courses for which there is not an equivalent A&M-Commerce course are accepted for generic credit. At the discretion of the major department, these courses may fulfill specific degree requirements.

A student may request a departmental review of course equivalency. It is the responsibility of the student to provide supporting materials, such as a course description, syllabus, and/or textbook to validate the equivalency of the course. The faculty advisor and department head reviews the courses on a case-by-case basis. Transfer credit is awarded in compliance with university academic standards and procedures.

- Remedial or developmental courses are not transferable and are rejected from GPA calculation.
- Courses completed with a grade of "D" are accepted in transfer and may be used to satisfy core curriculum requirements or as elective credit. Courses completed with a grade of "D" do not satisfy degree requirements in the industrial engineering major.
- Courses taken at other institutions are not included in the calculation of the institutional A&M-Commerce grade point average. The transfer grade point average is used to determine admissibility to the University and scholarship eligibility.

- Credit by examination earned at other institutions is treated as transfer credit only if the sending institution records the credit on the student's transcript with a regular catalog course number.
- Transfer courses taken under a quarter hour system are converted to semester hours. One quarter hour is equal to 2/3 semester hour.
- Total transfer hours accepted may be increased or decreased to reflect correction to prior evaluation and evaluation of additional transfer courses completed to ensure compliance with university academic standards and procedures.

A&M-Commerce participates in the **Texas Common Course Numbering System (TCCNS)**. TCCNS is a cooperative partnership between Texas community/junior colleges and universities. TCCNS provides a shared, uniform set of course designations to assist students and their advisors in determining course equivalencies and applicability of transfer credits on a statewide basis. The **Lower-Division Academic Course Guide Manual (ACGM)** is the official list of approved courses for general academic transfer that may be offered for state funding by public community and technical colleges in Texas. The common courses listed in the ACGM are numbered to correspond to TCCNS. The ACGM can be found at the following Texas Higher Education Coordinating Board (THECB) web site:

<http://www.thecb.state.tx.us/AAR/UndergraduateEd/WorkforceEd/acgm.htm>

5. State-Mandated and Local Articulation Agreements

State-mandated articulation requirements are defined under the Texas Administrative Code, Title 19, Part1, Chapter 4, Subchapter B Transfer of Credit, Core Curriculum, and Field of Study Curricula.

Every public college and university in Texas is required by law to have a **core curriculum** of at least 42 credit hours. The intent of the core is to provide a set of courses common to any baccalaureate degree. Core curricula are designed to offer students flexibility in selecting courses that align with their individual educational goals. The required components of the core include communications, mathematics, natural sciences, humanities, visual/performing arts, US history, political science, and social/behavioral science. By law, students who complete the core at one public institution can transfer the block of courses to another public institution, replacing the receiving institution's core curriculum. A&M-Commerce's core curriculum is referred to as **University Studies**, which is defined and outlined in the undergraduate catalog (<http://catalog.tamu-commerce.edu/content.php?catoid=14&navoid=521>).

A **Field-of-Study (FOS)** curriculum is a set of courses intended to satisfy the lower division requirements for a given academic discipline. Texas has established more than 10 Field-of Studies, including computer science, engineering, and engineering technology. The Engineering FOS attempted to encompass a common set of courses for all engineering disciplines. As a result, all of the courses do not apply to every engineering program. It is left to the student to determine which courses are applicable to the program at a targeted receiving institution. The components of the Engineering FOS

include calculus, differential equations, linear algebra, chemistry, physics, electrical circuits, and engineering mechanics. In the case of the industrial engineering program at A&M-Commerce, of the possible 43 hours a student could take, only 22 hours apply to the degree.

Both the core and FOS provide an avenue for students to transfer credits into an industrial engineering program. However, due to the designed flexibility and openness of both curricula, there is a potential for students to transfer uninformed or inadequately prepared for the industrial engineering program. For instance, a student can satisfy the mathematics requirement of the core curriculum with College Algebra. While this satisfies a core requirement, it does not meet an engineering degree requirement. Experience has shown this can result in transfer students opting for a major other than engineering to maximize their transfer credit. To minimize this scenario, the Department of Engineering & Technology has developed **2+2 articulated transfer agreements** with area community colleges. The agreements ensure students satisfy the core requirements of their home institution and can transfer a set of courses as a block to the industrial engineering program. Joint agreements have been signed with Northeast Texas Community College, Dallas County Community College District, and Collin College. An example of the memorandum of understanding and transfer crosswalk are provided as Attachment 1-3 at the end of this chapter.

D. Advising and Career Guidance

1. Advising

Student success and academic advising begins before the student arrives at A&M-Commerce. Typically, the initial contact with a potential student is made by the department's **Engineering Mentor/Transfer Liaison**. Following this contact, the Engineering Mentor/Transfer Liaison corresponds with the individual through a series of three electronic mailings. The first provides information about the degree programs and career fields as well as general information about applying to the university. The second deals with the rigors of an engineering program and what the student should be doing in advance to be successful, especially in the area of mathematics. The final mail out provides information about the department's articulation agreements and transferring credits. In addition to the electronic correspondence, the Engineering Mentor/Transfer Liaison serves as a clearing center for student questions, making sure they are routed to the appropriate person, both at the department, college, and university levels.

Upon declaring their major, industrial engineering students are assigned to a department **faculty advisor**. For incoming freshman and transfer students with less than 30 credit hours, they are also assigned to a university **Success Coach** as well as the department faculty advisor. Success Coaches serve as academic advisors, as well as assisting students with financial, personal, and career counseling. The goal of the University College is to assist students into college life and to provide guidance until they transition to working directly with their faculty advisor in their major. Freshmen remain under the guidance of the Success Coach until they have completed 1) their first academic year, 2)

24-hours of credit bearing courses, 3) University's basic skills requirements, and 4) declare a major. Transfer students with less than 30 hours, remain assigned to a Success Coach until such time that they 1) complete the University's basic skills requirements, 2) declare a major, and 3) complete 30 semester hours of credit bearing courses. The industrial engineering faculty advisor and Success Coaches work closely to ensure students are given the best opportunity to successfully complete the university studies as well as the industrial engineering degree requirements. This provides for a smooth transition when the student is transitioned into the department from the University College.

Industrial engineering students meet with their IE faculty advisor face-to-face each semester to review their progress and plan course schedules for the next semester. After final grades are posted at the end of the semester, course rosters are checked by the faculty advisor for enrolled students who did not pass the required prerequisite(s), if any. Students lacking the required prerequisites are contacted and schedules are reworked. Academic progress of each student is documented and maintained on the **IE curriculum flowchart**, provided as Attachment 1-1 at the end of this chapter. This document provides a formal record for the student and department as to the progress a student is making towards graduation.

Students remain with the same department faculty advisor throughout the duration of the degree program. Prior to entering their last semester, the IE faculty advisor meets with the student to review their transcript and degree evaluation/audit. If it is deemed the individual will be eligible for graduation at the end of the semester, the faculty advisor and student complete the Department of Engineering & Technology **graduation checkout form**, provided as Attachment 1-2 at the end of this chapter. The student's records are then reviewed by the Department Head and then the Dean's office before it is submitted to the Graduate Coordinator in the Registrar's office.

2. Career Guidance

The office of **Career Development** part of the **Student Access and Success One Stop Center**. Programs and services offered through Career Development include, but not limited to, resume consultation, mock interviews, career assessment, job search assistance, on-campus interviews, career workshops, and job fairs.

Career guidance is offered through the department's student organizations and events. Departmental student organizations are encouraged to bring in industry representatives to speak to their organizations and/or attend career related programs offered through professional societies. The Industrial Engineering student organizations include the Institute of Industrial Engineers (IIE) student chapter and the American Society for Quality (ASQ) student branch, which is sponsored by the Dallas ASQ Professional Section. The department hosts an annual **Engineering Day** during the national engineering week in February. The all day program consists of guest industry speakers as well as a networking lunch with upper level students and industry representatives.

E. Work in Lieu of Courses

A&M-Commerce awards undergraduate credit on the basis of a variety of local and nationally available examinations. Information related to credit by examination is outlined in the university undergraduate catalog as well as on the following Office of Student Assessment & Evaluation web page:

<http://web.tamu-commerce.edu/academics/testingOffice/creditByExam/default.aspx>

All credits by examination are subject to the following guidelines:

- Credit earned by examination may not be used to reduce in residence or advanced hour degree requirements established by A&M-Commerce.
- Credit earned by examination is not included in the computation of grade point averages.
- It is the responsibility of the student to present official scores to the Office of Student Assessment for submission of the appropriate paperwork to the Office of the Registrar for posting of credit on the student's transcript. Credits earned by exam will be recorded on the student's permanent record upon successful completion of at least 12 credit hours of academic work at Texas A&M University-Commerce.
- Credit for courses by exam received at another college or university will be accepted in transfer upon receipt of an official transcript.
- Standards for awarding credit by exam for courses are set by the academic department.
- Students may repeat a course for which credit was earned by exam by enrolling in a regularly scheduled class. The grade will replace the credit earned by examination.
- Fees for credit by examinations have been established by the Student Assessment Office. Fees vary by examination.

The examinations include: 1) the Advanced Placement Examination (AP); 2) the College Level Examination Program (CLEP); 3) the International Baccalaureate (IB) program; 4) the Defense Activity for Non-Traditional Educational Support Examinations (DANTES); 5) locally administered departmental exams.

1. **Advanced Placement (AP)**

The Advanced Placement (AP) program provided by the College Board enables students to enroll in challenging college-level studies while they are still in high school and to obtain college placement, credit, or both, on the basis of their performance on rigorous AP examinations. AP exams are given nationally at designated high schools during the month of May. AP exams are graded on a scale of 0-5. A score of 3 or higher is needed for credit. A matrix of all credit-by-exam programs including the exam titles, course equivalents, number of semester hours credited, and required scores can be obtained through the Office of Student Assessment & Evaluation.

2. College Level Exam Program (CLEP)

The College Level Exam Program (CLEP) provides students of any age with the opportunity to demonstrate college-level achievement through a program of exams in undergraduate college courses. The CLEP program is administered by the College Board and helps students enroll in advanced courses more quickly. CLEP offers exams which cover areas of Business, Composition and Literature, Foreign Languages, History and Social Studies, Science and Mathematics. CLEP exams are scored on a scale of 0-80. Upon making an acceptable score, as determined by A&M-Commerce, the student is awarded a set number of credit hours in a course equivalent to the subject area in which they took the CLEP exam. A matrix of all credit-by-exam programs including the exam titles, course equivalents, number of semester hours credited, and required scores can be obtained through the Office of Student Assessment & Evaluation

3. International Baccalaureate (IB)

The International Baccalaureate (IB) program is a rigorous pre-university program available worldwide through the International Baccalaureate Organization leading to assessment in six subject areas (Best Language, Second Language, Individuals and Societies, Experimental Science, Mathematics and Computer Science, and the Arts). The curriculum encourages critical thinking, community service, individual research, and inquiry into the nature of knowledge. The subject exams are scored on a 0-7 scale by a panel of international examiners. A minimum score of 4 is required to be considered for credit. A matrix of all credit-by-exam programs including the exam titles, course equivalents, number of semester hours credited, and required scores can be obtained through the Office of Student Assessment & Evaluation

4. DANTES Subject Standardized Tests (DSST)

The DSST program is a nationally recognized testing program that gives the opportunity to receive college credit for learning acquired outside a traditional college classroom. TAMU-Commerce only offers 3 hours of credit for human resources DANTES exam.

5. Local Credit-by-Exam

Credit-by-Exam can be granted through exams designed by departments at A&M-Commerce. By receiving a satisfactory score, students can earn 3 college credits toward a college degree for each exam taken.

The Department of Engineering & Technology does not have any local credit-by-exams for the Industrial Engineering program.

F. Graduation Requirements

A&M-Commerce offers 13 recognized degrees at the undergraduate level, including the Bachelor of Science. The general requirements for a Bachelor of Science are defined in the

University's undergraduate catalog. The candidate for a Bachelor of Science must meet all of the following requirements:

- **University Studies.** A minimum of 43 semester hours in general studies is required for a Bachelor of Science degree.
- **Junior Level Essay.** The Junior Level Essay (JLE), a writing competency exam, is a graduation requirement for all A&M-Commerce undergraduates. The JLE is administered on two consecutive days in October, February and June at no cost to students. Students are allowed two hours to write on prompts, one each day, that elicit a narrative essay. Essays are rated holistically within two weeks of the JLE administration by an interdisciplinary faculty team. A cumulative score of seven (7) is passing. This requirement may also be met by passing the essay portion of the THEA or alternative test, by passing English 333 or English 341. Distance education students need to contact the Student Assessment Office for optional arrangements.
- **Advanced Level Courses.** A student must complete at least 36 semester hours at the advanced level, 24 of which must be completed from A&M-Commerce. Credits transferred from a junior college or community college may not be used to satisfy the advanced coursework requirement. A minimum of 60 semester hours must be completed at A&M-Commerce or another senior level institution. Specific initiatives targeted at facilitating community college transfer to a four-year university are exceptions to this rule.
- **Residence Requirements.** For degree completion, at least 25 percent of credit semester hours must be earned through instruction at A&M-Commerce, as required by the Southern Association of Colleges and Schools (SACS). Furthermore, at least 24 of the final 30 semester hours must be taken at A&M-Commerce. Extension and correspondence credits may be used to satisfy residence requirements.
- **Fitness and Recreational Activity Requirements.** Two one-semester-hour courses in fitness and recreational activity are to be completed during the freshman and sophomore years at A&M-Commerce. For other options, see the *University Studies Requirements*.
- **Special Major Requirements.** In addition to meeting the above minimum requirements, the student must complete any other special requirements as outlined for each major subject. A minimum grade of "C" will be required in all undergraduate major courses. This includes all transfer and A&M-Commerce courses in the student's major area of study.
- **Semester Hours.** A student must complete a minimum of 120 semester hours, exclusive of English 100 and Math 131, with the following grade point requirements:
 - an overall 2.00 average;
 - a 2.00 average on all work completed at A&M-Commerce;
 - a 2.00 average in each major and minor; and
 - a 2.00 average at A&M-Commerce in each major and minor.
- **Correspondence and Extension Courses.** No more than 30 semester hours of extension and correspondence combined may apply toward a degree. No more than 18 of these 30 hours may be completed by correspondence. A maximum of 18 semester hours of advanced credit in a major field, when prerequisites have been satisfied, may be earned

and counted toward a baccalaureate degree from this institution. Note: The grade from a correspondence course will apply to the A&M-Commerce GPA.

An entering student must meet the degree requirements specified in the current or subsequent catalog. A student who fails to graduate within five years after admission will be required to meet the degree requirements of a subsequent catalog that is within five years of currency at the time of his graduation.

1. Bachelor of Science in Industrial Engineering

Candidates for the Bachelor of Science in Industrial Engineering must meet all of the university requirements for a Bachelor of Science as defined in the previous section as well as major area requirements. The required courses in the major, required support courses, suggested curriculum outline, and course descriptions are provided in the University's undergraduate catalog. In addition to the university studies, required courses in the major include:

Required courses in the major

IE 101 - Introduction to Industrial Engineering
IE 201 - Elementary Engineering Analysis
IE 207 - Engineering Economic Analysis
IE 211 - Engineering Probability and Statistics
IE 305 - Facilities Planning and Management
IE 311 - Advanced Engineering Statistics
IE 312 - Industrial Operations Research I
IE 313 - Industrial Operations Research II
IE 314 - Statistical Quality Control
IE 316 - Manufacturing Systems Design and Control
IE 403 - Human Factors Engineering
IE 407 - Production Systems Operations
IE 410 - Systems Simulation
IE 411 - Engineering Management
IE 431 - Principles of Programmable Automation
IE 444 - Systems Engineering
IE 471 - Planning for Industrial Systems Design
IE 486 - Service Systems Analysis
IE 495 - Industrial Systems Design
IT 111 - Computer Aided Design (CAD)

IT 112 - Product Design and Development

IT 340 or MGT 340 - Quality Management and Improvement

Required Support Courses

CHEM 1411 - General and Quantitative Chemistry I

CSCI 151 - Programming Fundamentals I

MATH 192 - Calculus II

MATH 315 - Differential Equations

MATH 335 - Linear Algebra

ECO 2301 - Principles of Macro Economics* **or**

ECO 2302 - Principles of Micro Economics*

PHYS 2425 - University Physics I* **and** PHYS 2426 - University Physics II*

MATH 2413 - Calculus I*

** These courses should be used to satisfy the University Studies Requirements in Social and Behavioral Science, Natural Sciences, and Mathematics, respectively; otherwise, the credit hours required to earn the B.S. in IE will exceed 128.*

Industrial engineering majors are required to complete the University Studies requirements and major area requirements. For a course to transfer into the industrial engineering major, a grade of “C” or better must be earned in the course. A grade of “C” or better is required in all industrial engineering major courses. Courses must be repeated if a grade of “C” or better is not earned in a major or required support course.

The required course sequence for the Bachelor of Science in Industrial Engineering is shown in Attachment 1-1 at the end of this chapter.

G. Transcripts of Recent Graduates

Transcripts of recent graduates are available upon request. Information related to the interpretation of the transcript is printed on the back side of an official transcript. There are no program options under the Bachelor of Science in Industrial Engineering. However, a number of industrial engineering students pursue a second major in Mathematics. The following are typical examples of how the program will be designated on the transcripts.

Degree Awarded: Bachelor of Science *Date awarded*
Major: Industrial Engineering
Major: 2nd Major in Mathematics
Inst. Honors: Cum Laude

Degree Awarded: Bachelor of Science *Date awarded*
Major: Industrial Engineering

CRITERION 1. STUDENTS

Attachment 1-1: Industrial Engineering Curriculum Flowchart

Texas A&M University-Commerce Bachelor of Science in Industrial Engineering (IE) 2010-2011 Curriculum Flowchart								Sem.			
Student name: _____								CWID: _____	Second Major in Mathematics: Math 314		
FA (1) 16	SP (2) 17	FA (3) 17	SP (4) 17	FA (5) 15	SP (6) 15	FA (7) 15	SP (8) 16	Math ???			
Eng 1301 College R&W	Eng 1302 or g Writ Arg & Res	PSci 2301 Pr US TX Gov	PSci 2302 or e US TX Gov: IP	Eco ??? Alternative A1	IE 305 Facil Pn & Mgt	IE 411 ac Eng Mgt	Elective E3 US Hum	Math ???			
Hist 1301 US Hist 1877	Hist 1302 US Hist 1865	Phys 2425 e or j Mech & Heat	Phys 2426 or e Mag & Elec	IE 312 Ind Op Res I	IE 313 Ind Op Res II	IE 431 e Prin Prog Autc	Elective E4 US V/P Arts	Non-Degree Math. PJCM 306 PJCM 300 Math 131 Math 1314 Math 142			
IE 101 Intro to IE	Chem 1411 j G & Q Chem I	IE 201 Elem Eng Ana	IE 207 Eng Eco Anal	?? 340 b Alternative A2	IE 314 Stat Qual Con	IE 403 Hum Fact Eng	IE 444 ce Sys Eng	Assessment Off. One Stop Shop Math Place Exams			
IT 111 Comp Aid Des	IT 112 Product D&D	CSci 151 k Prog Fund I	Math 335 l Linear Alg	Spc ???? Alternative A3	IE 316 Mgt Sys D&C	IE 407 Prod Sys Ops	IE 486 acf Serv Sys Ana	Elective E3: Eng 2326,202,2331; Hist 264,265; Jour 1307-Phil 1301, 331,332,360,362; PSci 410,411,412; RTV 1335;Spc 2301			
Math 2413 h Calculus I	Math 192 Calculus II	Math 315 Diff Equations	IE 211 Eng Prob Stat	IE 311 Adv Eng Stat	IE 410 Sys Sim	IE 471 acde Plan Ind S D	IE 495 acdf Ind Sys Des	Elective E4: Art 1303,1301,301, 304,307;Eng 432, 434;Mus 102,1308; The 1310,340,440			
Prerequisite: Co-requisite:								Selected British Studies courses may satisfy			
Elective E1: US PE Activity Elective E2: US PE Activity								Electives E3 & E4			
Electives E1 & E2: Any two FRA 141 or Mus 100 (Marching Band) courses;											
No repeats except FRA 100 (need Health & Human Performance Dep. Head approval); Apply for FRA credit for military service by submitting a copy of DD Form 214 to the University Admissions Office											
Other IE courses: 389,489 (Ind Study); 397,497 (Spec Top); 490 (Honors Thesis); 491 (Honors Read)											
1	2	3	Student grade in course Bold outline is a required course in the major (minimum passing grade is C):				67	sh			
4	Semester course completed (e.g., FA07, WM07, SP08, MM08, ...				Bold underline is a required support course (min. pass. grade is C as of SP08):				17	sh	
5	Course semester hours (sh) ...S108, S208, AM08				Double underline is a required support course satisfying university studies reqs.				15	sh	
4 Course ID & number, OTHER PREREQUISITES after " "								Unbolded outline is a university studies course (minimum passing grade is D):		29	sh
E1 ID & #:		E1 title:		Minimum total grade average to receive Bachelor of Science degree in IE is C:				128	sh		
E2 ID & #:		E2 title:		OTHER PREREQUISITES:							
E3 ID & #:		E3 title:		g advanced placement or CLEP							
E4 ID & #:		E4 title:		a IE major				h Tw o yrs. HS Alg. & Trig. or Math 142 (Pre-Cal)			
5 Course title											
A1: Eco 2301 (Principles of Macro Economics) or 2302 (Principles of Micro Economics)				d Same AY as IE 495				j Calculus skills			
A2: IT 340 (Quality Mgt & Improvement) or MGT 340 (Quality Mgt & Improvement)				e Instructor consent				k Computer literacy or CSci 126 (Micro App)			
A3: Spc 1311 (Fundamentals of Speech) or 1321 (Business & Professional Speaking)				f Final semester				l Math 331 (Disc Math) w/ waived			
Light gray shade (25%) means an equivalent transferred course								Medium gray shade (50%) means the course was substituted or transitioned (see the student's file)			

1 Major GPA					1 and 2 GPA				
grade	pts	sh	pts×sh		grade	pts	sh	pts×sh	
IE 101	0				Chem 1411 j	0			
IT 111	0				Chem 111L	0			
IT 112	0				Chem 101				
IE 201	0				Math 192	0			
IE 207	0				CSci 151 k	0			
IE 211	0				Math 315	0			
IE 312	0				Math 335 l	0			
?? 340 b	0				Sums		0		0
IE 311	0								
IE 305	0								
IE 313	0								
IE 314	0								
IE 316	0								
IE 410	0								
IE 411 ac	0								
IE 431 e	0								
IE 403	0								
IE 407	0								
IE 471 acde	0								
IE 444 ce	0								
IE 486 acf	0								
IE 495 acdf	0								
Sums		0		0					

2 Required Support Course GPA					4 US GPA				
grade	pts	sh	pts×sh		grade	pts	sh	pts×sh	
Chem 1411 j	0				Eng 1301	0			
Chem 111L	0				Hist 1301	0			
Chem 101					Eng 1302 or g	0			
Math 192	0				Hist 1302	0			
CSci 151 k	0				PSci 2301	0			
Math 315	0				Elective E1	0			
Math 335 l	0				PSci 2302 or e	0			
Sums		0		0	Elective E2	0			
					Spc ????	0			
					Elective E3	0			
					Elective E4	0			
					Sums		0		0

3 Required Support Course, US GPA					5 Second Major in Mathematics				
grade	pts	sh	pts×sh		grade	pts	sh	pts×sh	
Math 2413 h	0				Math 314				
Phys 2425 e or j	0				Math ???				
Phys 2426 or e	0				Math ???				
Eco ???	0				Sums		0		0
Sums		0		0					

CRITERION 1. STUDENTS

Attachment 1-2: Department of Engineering & Technology Graduation Checkout Form

Texas A&M University - Commerce						
Graduation Checkout						
Semester _____			Year _____			
I plan to graduate: (Place an X in the left hand box)			Name			
<input type="checkbox"/> Spring _____			CWID			
<input type="checkbox"/> Summer _____			DATE			
<input type="checkbox"/> Fall _____						
Current Semester Courses			Courses you plan to take Winter Mini			
1			1			
2			2			
3						
4						
			Courses you plan to take May Mini			
5			1			
6			2			
7						
			Courses you plan to transfer from another institution			
			1			
			2			
			3			
Courses to be Taken in Following Semester			List Institution for each transfer			
1			1			
2			2			
3			3			
4						
5						
6						
7						
			Courses you plan to CLEP or use correspondence			
			1			
			2			
			3			
			List Institution for each course			
				CLEP	Trans	
			1			
			2			
			3			
			Yes	No	Pending Date	
English Usage Requirement (JLE, TSI, Etc.)						
Advanced Level Hours						
36 Total Advanced Hours						
24 Advanced Hours at A&M-Commerce						
Minimum 60 Hours @ Senior Institution						
Residence Requirement						
25% of Courses needed for degree @ A&M-Commerce						
24 of Final 30 hours at A&M-Commerce						
Degree Requirements						
Overall GPA 2.0 or Better						
C or better in all required classes						
GPA 2.0 or Better on all hours completed @ A&M-Commerce						
Notes:						
I have met with my academic advisor and understand that I must complete any deficiencies prior to graduation. I have read the second page of this form and am aware of the conditions for graduation. If I do not meet the requirements I understand that I must re-file with the CBT.						
Print Student's Name:			Student's Signature:		Date:	
I have met with this student and verified what is needed for this student to graduate.						
Print Advisor's Name			Advisor's Signature:		Date:	
I concur with the student's and advisor's graduation plan.						
Department Head's Signature:			Department:		Date:	
I certify that if the student meets the above requirements they will be eligible for graduation						
Dean's Signature			College of Business & Technology		Date:	

CRITERION 1. STUDENTS

Attachment 1-3: Example of a 2+2 Industrial Engineering Articulation Agreement

Memorandum of Understanding and Articulation Agreement Pertaining to the Bachelor of Science Degree in Industrial Engineering

**Texas A&M University-Commerce
Department of Industrial Engineering & Technology
and
Dallas County Community College District**

The intent of this agreement between Texas A&M University–Commerce (A&M-Commerce) and the Dallas County Community College District (DCCCD), is to increase the number and quality of students matriculating from DCCCD into the Industrial Engineering program at A&M-Commerce. Concomitantly, this agreement is designed to foster enhanced transfer process for DCCCD students pursuing a bachelor degree in engineering.

This agreement recognizes the following terms and conditions:

1. Representatives from A&M-Commerce’s and DCCCD’s admission’s staff, academic advisors, and engineering faculty will collaborate to select students for the program and will provide advising to students in the program.
2. The A&M-Commerce Industrial Engineering faculty and staff will provide support to DCCCD faculty through the sharing of course syllabi and other pertinent ABET related material.
3. Students who successfully complete the DCCCD Associate in Sciences with an Emphasis in Industrial Engineering will be able to transfer a block of 60 credit hours into the A&M-Commerce Industrial Engineering degree. The transfer courses must meet the A&M-Commerce Department of Industrial Engineering & Technology core required GPA and the minimum grade per course for transferring to the A&M-Commerce Department of Industrial Engineering curriculum. A&M-Commerce will accept all courses as outlined in the transfer guide.
4. The A&M-Commerce / DCCCD Equivalency Transfer Guide, attached hereto and incorporated herein by reference as Exhibit A, will be reviewed and updated by DCCCD and A&M-Commerce faculty and advisors on at least a yearly basis. The Office of Transfer Services and University Relations at DCCCD and department chair for the Department of Industrial Engineering & Technology at A&M-Commerce will approve changes.
5. DCCCD students successfully completing the Associate in Science with an Emphasis in Industrial Engineering program according to the specified transfer guide and who maintain a minimum cumulative GPA of 2.5 in transferable hours will gain automatic admission into A&M-Commerce’s Department of Industrial Engineering.

6. The progress of this program will be monitored by both A&M-Commerce and DCCCD and may be revised by mutual agreement at any time. Either party may terminate this agreement at any time, with a 120 day notice, when the said party believes that termination is in the best interest of all parties concerned. Those students already participating in the program at the time of termination will have their coursework honored by A&M-Commerce as transfer credit.
7. A copy of the Memorandum of Understanding and Articulation Agreement, along with the A&M-Commerce / DCCCD Equivalency Transfer Guide will be kept in the office of Academic Affairs and Transfer Programs at DCCCD and the Department of Industrial Engineering at A&M-Commerce.
8. Annually, A&M-Commerce and DCCCD will share data related to the enrollment, scholastic progress, and academic performance of former and active cooperative students in order to evaluate the success of this program.
9. DCCCD and A&M-Commerce will collaborate on the design of marketing materials, which will be distributed to current students, potential students, or the community at large to publicize this agreement.
10. The faculty and administrators from A&M-Commerce and DCCCD will consult annually to assess and develop program offerings; to schedule student and faculty class visits; and to explore potential joint grant funding. These meetings may be face-to-face at the request of either DCCCD or A&M-Commerce.
11. Dispute Resolution: The dispute resolution process provided in chapter 2260, Texas Government Code, and the related rules adopted by the Texas Attorney General pursuant to chapter 2260, shall be used by A&M-Commerce and DCCCD to attempt to resolve any claim for breach of contract made by either party that cannot be resolved in the ordinary course of business. The parties shall submit written notice of a claim of breach of contract under this Chapter to the respective undersigned part, who shall examine the claim and any counterclaim and negotiate with the other respective party in an effort to resolve the claim.
12. Governing Law and Venue: This agreement shall be governed and interpreted pursuant to the Constitution and Laws of the state of Texas. Pursuant to Section 85.18, *Texas Education Code*, venue for any suit filed against A&M-Commerce shall be in the county in which the primary office of the chief executive officer of A&M-Commerce is located. At the time of this Agreement, such county is Hunt County, Texas.
13. Amendments, Changes or Modifications: No amendment, change or modification to the MOU may be made except in writing by all parties.

The parties hereto certify that they have the authority to execute this MOU and that covenants contained herein are within their respective statutory authority to fulfill. The undersigned parties bind themselves to the faithful performance of this MOU.

IN WITNESS THEREOF, the parties execute this Memorandum of Understanding.

**Dallas County Community College
District (DCCCD)**

**Texas A&M University-Commerce
(A&M-Commerce)**

Dr. Wright Lassiter, Chancellor

Dr. Dan Jones, President

Date

Date

Dr. Larry Lemanski, Provost and Vice President
for Academic Affairs

Date

ASSOCIATE IN SCIENCES DEGREE WITH AN EMPHASIS IN INDUSTRIAL ENGINEERING

Available at Eastfield and Richland Colleges in conjunction with Texas A&M University (Commerce)

Degree Code: AS.TAMU.INDUST.11

This is an "Articulated Emphasis" degree with Texas A&M University (TAMU) - Commerce.

Students who complete this degree with a GPA of 2.50 with no grade below that of "C" and who meet all admissions requirements at TAMU will be accepted into TAMU's Bachelor of Science in Industrial Engineering program. Students should follow this plan only if they wish to transfer to TAMU in Industrial Engineering. Students wishing to transfer to another university should not assume this entire plan will transfer.

In order to be eligible to receive this AS degree, a student must:

1. Complete a minimum of 62 credit hours indicated in this degree plan;
2. Earn a grade of "C" or better in English 1301, Speech 1311 or 1321, and Math 2513;
3. Receive a GPA (2) of at least 2.00 ("C")
[NOTE: TAMU-C guarantees admission with a 2.50 GPA with no grade below a "C"];
4. Meet all Texas Success Initiative (TSI) standards and course prerequisites; and
5. Complete at least 25% of the credit hours required for graduation through instruction by the college awarding the degree.

Students who plan to transfer to TAMU-Commerce must work closely with an advisor/counselor.

Course Requirements for the AS Degree Emphasis in Industrial Engineering	Credit Hours
TIER 1 - CORE FOUNDATIONS	
CRITICAL READING AND WRITING <i>Select EACH of the following:</i> ENGL 1301 (a grade of "C" or better required) HIST 1301	6
SPEAKING AND LISTENING <i>Select ONE of the following:</i> SPCH 1311 or 1321 (a grade of "C" or better required)	3
QUANTITATIVE REASONING <i>Select the following:</i> MATH 2513 (A grade of "C" or better required)	5

WELLNESS AND THE HUMAN EXPERIENCE **1**
Select the following:
PHED 1164

TIER 2 - CORE DOMAINS

QUALITATIVE REASONING, LITERACY AND RESEARCH **3**
Select the following:
ENGL 1302

SELF AND SOCIETY **9**
Select ONE of the following:
ECON 2301 *or* ECON 2302

Select the following:
GOVT 2301

Select the following:
HIST 1302

HUMANITY, CREATIVITY AND THE AESTHETIC EXPERIENCE **6**
Select ONE of the following:
ARTS 1301, 1303, 1304; DANC 2303; DRAM 1310, 2361, 2366; HUMA
1311, 1315; MUSI 1306, 1308, 1309, 1310

Select ONE of the following:
ENGL 2321, 2322, 2323, 2326, 2327, 2328, 2331, 2332, 2333, 2342, 2343,
2351; HUMA 1302, 1305, 2319; PHIL 1301, 1304, 1316, 1317, 2303, 2306,
2307, 2316, 2317, 2318, 2321

SCIENTIFIC DISCOVERY AND SUSTAINABILITY **8**
Select TWO of the following:
PHYS 2425
PHYS 2426

TIER 3 - INTEGRATIVE LEARNING

**CRITICAL ISSUES IN LOCAL, NATIONAL AND GLOBAL
CONTEXTS** **3**
Select the following:
GOVT 2302

CORE CREDIT HOURS FOR THIS AS DEGREE **44**

INDUSTRIAL ENGINEERING EMPHASIS

Select EACH of the following: **18**
CHEM 1411
MATH 2414
COSC 1436 C++

Select ONE of the following:

ENGR 1304

DFTG 1305, 1309, 2332

Select ONE of the following:

MCHN 1352 Intermediate Machining I or

MCHN 2338 Advanced Computer-Aided Manufacturing - CAM

TOTAL CREDIT HOURS REQUIRED FOR THIS AS DEGREE

62*

**The 62 hours corresponds to 60 hours that can be applied to the Industrial Engineering degree requirements at A&M - Commerce. Students successfully completing the degree will earn an Associate in Science degree in addition to being a CORE completer.*

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

Texas A&M University-Commerce provides a personal educational experience for a diverse community of life-long learners. Our purpose is to discover and disseminate knowledge for leadership and service in an interconnected and dynamic world. Our challenge is to nurture partnerships for the intellectual, cultural, social, and economic vitality of Texas and beyond.

1. Imperatives or Guiding Principles 2010-2011

Diversity: Foster a culture of inclusion which attracts to our university highly qualified students, faculty, and staff who represent the diversity of the region we serve, and who will engage with us in the pursuit of our university's vision and mission.

Service: Promote excellence in service to members of all internal and external communities.

Student Success: Pursue and implement effective, research-based strategies that provide all students the resources, support, and high-quality instruction they need to achieve their goal of earning a college degree.

Stewardship: Advance the university by demonstrating the quality of our programs and services to an ever-expanding community of supporters. Leverage the value of public, private, and human resources through business practices that are founded in accountability and transparency, and academic practices that are continuously improved through research, assessment, and innovation.

Globalization: Cultivate an academic environment enlivened by global interconnections that traverse the boundaries of culture, politics, and place.

Research: Strengthen the nexus between teaching and research in ways that speak to the university's imperative both to create and disseminate knowledge.

Communication: Develop a consistent, authentic, and reliable message that effectively conveys our commitment to extending opportunity, transforming lives, and shaping futures through education.

B. Program Educational Objectives

The Program Educational Objectives (PEO) for the Bachelor of Science in Industrial Engineering are:

PEO #1 Students will have the ability to convincingly present their solutions and to do so in the context of written, oral, and electronic media.

PEO #2 Students will be prepared to function effectively and provide leadership with an organization as an IE professional including an ability to select and organize, facilitate, lead, coordinate, and participate in teams as well as understand organizational processes and behavior.

- PEO #3 Students will demonstrate an understanding of the need to collect, analyze, and interpret data relevant to problems arising in the IE discipline.
- PEO #4 Students will have the ability to approach and diffuse unstructured problems.
- PEO #5 Students will demonstrate an understanding of and the need to accomplish life-long growth within the industrial engineering profession.
- PEO #6 Students will be able to utilize the methodological and computational skills to operate effectively within an IE work discipline.

The Industrial Engineering PEOs are available to the general public in the following locations:

University's undergraduate catalog

http://catalog.tamu-commerce.edu/preview_program.php?catoid=14&poid=1567&returnto=512

Department of Engineering & Technology – Industrial Engineering program web page

<http://web.tamu-commerce.edu/academics/colleges/businessTechnology/departments/industrialEngineeringTechnology/programs/industrialEngineering.aspx>

Industrial Engineering Information Flyer

Information flyer distributed to prospective students during recruitment & marketing events.

C. Consistency of the Program Educational Objectives with the Mission of the Institution

The **University values** of ceaseless industry, fearless investigation, unfettered thought, and unselfish service to others through Integrity, Innovation, and Imagination, capture the essence of engineering. Industry, investigation, innovation, and service are reflected in the description of an engineer found in the United States Department of Labor's *Occupational Outlook Handbook*.

Engineers apply the principles of science and mathematics to develop economical solutions to technical problems. Their work is the link between scientific discoveries and the commercial applications that meet societal and consumer needs.

As evidenced in the mission statement, the **University Mission** is to foster the development of leaders to impact Northeast Texas, Texas, and beyond culturally, socially, and economically through innovation, discovery, and service. The Industrial Engineering PEOs are consistent and align with the mission of the institution.

PEO #1 Students will have the ability to convincingly present their solutions and to do so in the context of written, oral, and electronic media.

*Texas A&M University-Commerce provides a personal educational experience for a diverse community of life-long learners. Our purpose is to discover and **disseminate knowledge for leadership and service** in an interconnected and dynamic world. Our challenge is to nurture partnerships for the intellectual, cultural, social, and economic vitality of Texas and beyond.*

PEO #2 Students will be prepared to function effectively and provide leadership with an organization as an IE professional including an ability to select and organize, facilitate, lead, coordinate, and participate in teams as well as understand organizational processes and behavior.

Texas A&M University-Commerce provides a personal educational experience for a diverse community of life-long learners. Our purpose is to discover and disseminate knowledge for leadership and service in an interconnected and dynamic world. Our challenge is to nurture partnerships for the intellectual, cultural, social, and economic vitality of Texas and beyond.

PEO #3 Students will demonstrate an understanding of the need to collect, analyze, and interpret data relevant to problems arising in the IE discipline.

Texas A&M University-Commerce provides a personal educational experience for a diverse community of life-long learners. Our purpose is to discover and disseminate knowledge for leadership and service in an interconnected and dynamic world. Our challenge is to nurture partnerships for the intellectual, cultural, social, and economic vitality of Texas and beyond.

PEO #4 Students will have the ability to approach and diffuse unstructured problems.

Texas A&M University-Commerce provides a personal educational experience for a diverse community of life-long learners. Our purpose is to discover and disseminate knowledge for leadership and service in an interconnected and dynamic world. Our challenge is to nurture partnerships for the intellectual, cultural, social, and economic vitality of Texas and beyond.

PEO #5 Students will demonstrate an understanding of and the need to accomplish life-long growth within the industrial engineering profession.

Texas A&M University-Commerce provides a personal educational experience for a diverse community of life-long learners. Our purpose is to discover and disseminate knowledge for leadership and service in an interconnected and dynamic world. Our challenge is to nurture partnerships for the intellectual, cultural, social, and economic vitality of Texas and beyond.

PEO #6 Students will be able to utilize the methodological and computational skills to operate effectively within an IE work discipline.

Texas A&M University-Commerce provides a personal educational experience for a diverse community of life-long learners. Our purpose is to discover and disseminate knowledge for leadership and service in an interconnected and dynamic world. Our challenge is to nurture partnerships for the intellectual, cultural, social, and economic vitality of Texas and beyond.

Guiding principles or imperatives were developed by the university as part of a 5-year **strategic plan** to enable the institution to achieve its overall mission. The Industrial Engineering program is aligned with the following guiding principles or imperatives.

Guiding Principle/Imperative 1 – Diversity

Strategy 1.1: Our student body, both undergraduate and graduate, will reflect the ethnic diversity of the region served by A&M-Commerce.

Table 2-1: Comparison of Industrial Engineering and University Demographics

<i>Ethnicity</i>	<i>IE Program¹</i>	<i>University²</i>
<i>White, Non-Hispanic</i>	<i>58.14%</i>	<i>63.73%</i>
<i>Black, Non-Hispanic</i>	<i>22.09%</i>	<i>17.24%</i>
<i>Hispanic American</i>	<i>9.30%</i>	<i>9.10%</i>
<i>International Student</i>	<i>6.98%</i>	<i>6.24%</i>

Asian	2.33%	2.11%
American Indian / Alaskan Native	1.16%	1.06%
Unknown	0%	0.54%

¹A&M-Commerce Office of Institutional Research

²Texas Higher Education Coordinating Board

Guiding Principle/Imperative 2 – Service

Strategy 1.4: Provide service to the community, region, state, and the nation as evidenced by an annual assessment of the number of employees engaged in activities and the potential impact on the economy and society.

The industrial engineering faculty, staff, and student organizations are involved in a variety of service activities, which impact or have potential to impact the economy and society. Examples of service activities include, but are not limited to:

- *Lion’s Pride BEST Robotics: Robotics competition hosted by the department. Program is free of charge to area school districts, allowing schools of any size or socioeconomic status to participate. [STEM participating]*
- *Engineering Summer Programs: Two-week summer camps, focused on engineering, science, and mathematics. Participating schools are rural and economically disadvantaged, with an emphasis on first-generation college students. [STEM participation].*
- *Regional Involvement: North Central Texas InterLink Board of Directors, NorthEast Texas Career and Technical Consortium Advisory Board, and Paris Texas Economic Development Corporation. [Regional Economy and Education]*
- *State-level Involvement: Engineering Technology Field-of-Study, Workforce Education Course Manual (WECM) Project Facilitator, and Sulphur River Regional Mobility Authority. [State Economy and Education]*

Guiding Principle/Imperative 3 – Student Success

Strategy 1.3: The number of undergraduate degrees awarded from critical shortage fields which have been identified by the Texas Higher Education Coordinating Board will improve five percentage points between 2011 and 2015.

In response to this developing crisis and other critical issues facing Texas and the United States, the Texas Higher Education Coordinating Board (THECB) adopted and implemented the Closing the Gaps: the Texas Higher Education Plan in October 2000. The plan established goals in the areas of participation, success, excellence, and research. One key strategy under the goal of success is to significantly increase the number of STEM degrees, including engineering, awarded by higher education institutions in Texas.

The University’s strategic plan is shown in Attachment 2-1 at the end of this chapter and is available online at <http://web.tamu-commerce.edu/aboutUs/ourMission/default.aspx>.

D. Program Constituencies

The primary constituencies of the Industrial Engineering program include 1) current students*, 2) alumni, 3) industrial engineering professionals, and 4) employers. The industrial engineering professionals are represented by the faculty, industry advisory board (IAB) members, Institute of Industrial Engineers members, and ABET. In addition to the companies that employ IE graduates, the employers are also represented by the industry advisory board members and internship / cooperative learning sponsors. Examples of area employers include, but are not limited to:

- L-3 Communications (Greenville, Texas)
- Raytheon (McKinney, Texas)
- Campbell (Paris, Texas)
- Morning Star Foods (Sulphur Springs, Texas)
- Turner Pipe (Paris, Texas)
- Lockheed Martin (Camden, Arkansas)
- Bell Helicopter (Amarillo, Texas)
- Aerostar (Sulphur Springs, Texas)
- Texas Instruments (Dallas, Texas)
- Kimberly Clarke (Paris, Texas)
- Siemen Logistics (Coppell, Texas)
- Vista Wall (Terrell, Texas)
- Guaranty Bond Bank (Sulphur Springs, Texas)
- Covidien (Commerce, Texas)

*Program educational objectives are broad statements that describe what graduates are expected to attain within a few years of graduation. By definition, PEOs do not directly meet the needs of students currently in the IE program. However, if the PEOs address the needs of the alumni, IE professionals, and employers, then indirectly they meet the needs of current students.

The industrial engineering PEOs were developed with the intent to provide a set of skills and/or knowledge, that when achieved, will enable an individual to be success in the chosen field of industrial engineering. Graduates benefit from having an employable skill set, employers benefit from having a talent pool to draw from with a required skill set, and the IE professions benefit from the continuation and viability of their profession and career field.

Consistency and alignment with requirements established by professional societies or organizations provide evidence the PEOs meet the primary needs of the program constituencies.

National Academy of Engineering

In the recent publication, *The Engineer of 2020: Visions of Engineering in the New Century*, the National Academy of Engineering identified key attributes necessary to “support the success and relevance of the engineering profession” into the next century. These attributes include strong analytical skills, practical ingenuity, creativity, good communication,

leadership, high ethical standards, agility and flexibility, and lifelong learners. The industrial engineering PEOs align closely with the Academy's research on key attributes of engineers.

PEO #1 Students will have the ability to convincingly present their solutions and to do so in the context of written, oral, and electronic media.

- *Good communication*
- *Leadership*

PEO #2 Students will be prepared to function effectively and provide leadership with an organization as an IE professional including an ability to select and organize, facilitate, lead, coordinate, and participate in teams as well as understand organizational processes and behavior.

- *Strong analytical skills*
- *Good communication*
- *High ethical standards*
- *Agility and flexibility*

PEO #3 Students will demonstrate an understanding of the need to collect, analyze, and interpret data relevant to problems arising in the IE discipline.

- *Strong analytical skills*
- *Practical ingenuity*
- *Creativity*

PEO #4 Students will have the ability to approach and diffuse unstructured problems.

- *Strong analytical skills*
- *Practical ingenuity*
- *Creativity*
- *Leadership*
- *Agility and flexibility*

PEO #5 Students will demonstrate an understanding of and the need to accomplish life-long growth within the industrial engineering profession.

- *Lifelong learners*

PEO #6 Students will be able to utilize the methodological and computational skills to operate effectively within an IE work discipline.

- *Strong analytical skills*
- *Practical ingenuity*
- *Creativity*
- *Agility and flexibility*

Institute of Industrial Engineers

The Institute of Industrial Engineers (IIE) defines Industrial Engineering as:

Industrial engineering is concerned with the design, improvement, and installation of integrated systems of people, materials, information, equipment, and energy. It draws upon specialized knowledge and skill in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design, to specify, predict, and evaluate the results to be obtained from such systems.

The PEOs align and reflect the skills and knowledge outlined in the Institute of Industrial Engineer’s definition. Achievement of the PEOs will position graduates to be successful in the field of industrial engineering.

ABET

Program criteria that apply to industrial engineering programs include:

The curriculum must prepare graduates to design, develop, implement, and improve integrated systems that include people, materials, information, equipment and energy. The curriculum must include in-depth instruction to accomplish the integration of systems using appropriate analytical, computational, and experimental practices.

The PEOs align and reflect the skills and knowledge outlined in the ABET *Criteria for Accrediting Engineering Programs*. Achievement of the PEOs will position graduates to be successful in the field of industrial engineering.

E. Process for Revision of the Program Educational Objectives

The industrial engineering PEOs were developed by the industrial engineering faculty utilizing research and input from the program constituencies. The PEOs are based on the needs of the stakeholders with the intent to provide a set of skills and/or knowledge that when achieved will enable an individual to be success in the chosen field of industrial engineering. Program faculty have the responsibility to revise, as necessary, the PEOs. Figure 2-1 shows the graphical representation of the PEO review process.

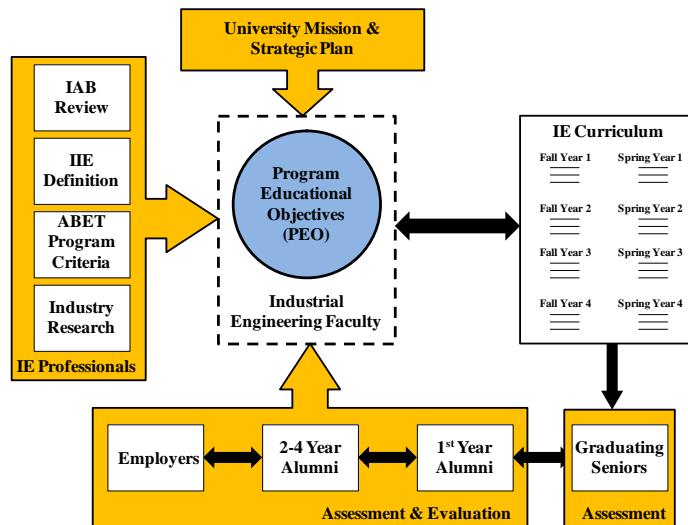


Figure 2-1: PEO Evaluation and Revision Process

As defined in the ABET 2011-2012 *Criteria for Accrediting Engineering Programs*, PEOs are statements that describe what graduates should attain within a few years of graduation and are based on the needs of the program constituencies. There is a variety of entry points into the review process but all the key constituents needs and voices are considered. The complete review process is scheduled on a three year cycle. However, there is annual input into the process and revisions can occur more frequently if deemed necessary.

University Mission & Strategic Plan: Any strategic changes made at the university level results in an evaluation of the PEOs to ensure they remain consistent to the university mission. In addition, the university's guiding principles are considered in the department strategic planning.

The university's mission statement was revised since the last general review. This was a result of a change in the administration at the provost and president levels. The changes occurred as a result of the retirement of the former university president. The mission statement during the last general review was:

Texas A&M University-Commerce nurtures and educates for success through access to academic, research, and service programs of high quality.

The current mission statement has similar elements but provides more specificity.

Texas A&M University-Commerce provides a personal educational experience for a diverse community of life-long learners. Our purpose is to discover and disseminate knowledge for leadership and service in an interconnected and dynamic world. Our challenge is to nurture partnerships for the intellectual, cultural, social, and economic vitality of Texas and beyond

It was determined the PEOs were consistent with the amended university mission statement and no revisions were necessary. Section C of this chapter provides evidence of the consistency between the PEOs and mission statement.

IE Professionals: The ABET program criteria for industrial engineering are reviewed on an annual basis. Any significant changes result in the PEOs being re-evaluated to ensure they remain properly aligned. In addition, research from industry or professional societies is considered when the PEOs are evaluated. Examples include the National Academy of Engineering's *The Engineer of 2020: Visions of Engineering in the New Century* and the IIE characteristics of an industrial engineer. Section D of this chapter provides evidence of the consistency between the PEOs and the cited sources.

The Industry Advisory Board (IAB) is comprised of industry representatives and employers from the field of industrial engineering. The IAB reviews key elements and provides guidance for the program. The IAB is asked to review the PEOs on a periodic basis. The last time was in Spring 2011. There was a consensus from the members that the PEOs were relevant and appropriate. The IAB review is going to be tied to the same cycle as the employer survey in the future.

It was determined the PEOs were consistent with the IE professional needs so no revisions were necessary.

Assessment: Four different assessment instruments are utilized to assess the attainment of the PEOs: 1) Graduating Senior Exit Survey, 2) 1st-Year Alumni Survey, 3) 2-4 Year Alumni Survey, and 4) Employer Survey. A full description of the assessment instruments and process is provided in the Criterion 4 – Continuous Improvement chapter of this report.

A PEO assessment process was established prior to the last general review. Based upon the original process, attainment of the PEOs would be primarily evidenced by the results of an alumni and employer survey. The effectiveness of the process was initially impacted by 1) the Industrial Engineering program being new and having a small number of graduates, 2) difficulty in obtaining assessment data on graduates from employers due to legal and privacy issues, and 3) the resignation of two founding faculty members, who received new appointments at out-of-state universities. Based upon recommendations from the Industry Advisory Board and information from ABET workshops, the current program faculty reviewed, revised, and re-implemented the PEO assessment process in Spring 2009. The process still utilizes alumni and employer surveys but two additional instruments were added to strengthen and make the process more effective. This process was reported in a Due Process Response to ABET in November 2009.

A schedule for the revised PEO Assessment process is provided in Table 2-1. Assessment data was collected under the old process but survey points are not shown in the table.

Table 2-1: PEO Assessment Cycle

	Spr '09	Spr '10	Spr '11	Spr '12	Spr '13	Spr '14	Spr '15	Spr '16	Spr '17
Graduating Senior Exit Survey	√	√	√	√	√	√	√	√	√
1 st -Year Alumni Survey		√	√	√	√	√	√	√	√
2-4 Year Alumni Survey		√			√			√	
Employer Survey	√			√			√		

A complete assessment cycle has been completed under the new assessment process. Initial results indicate graduates achieved the PEOs and they are meeting the needs of the alumni and employers.

Texas A&M University-Commerce



Strategic Plan, 2011-2015

University Values

Ceaseless industry, fearless investigation, unfettered thought, and unselfish service to others through Integrity, Innovation, and Imagination.

University Vision

Texas A&M University-Commerce, as a part of the A&M family of universities, will become the university of choice for all those seeking a higher education in the Northeast Texas region and beyond. It will provide traditional and non-traditional learning opportunities through existing and new programs that set high expectations and goals for students, faculty, and staff. The university will provide a sense of community through a nurturing environment for all individuals in order to maximize learning, career and personal development. A&M-Commerce will become a place where students, faculty, staff, and community are engaged in the pursuit of excellence.

University Mission

Texas A&M University-Commerce provides a personal educational experience for a diverse community of life-long learners. Our purpose is to discover and disseminate knowledge for leadership and service in an interconnected and dynamic world. Our challenge is to nurture partnerships for the intellectual, cultural, social, and economic vitality of Texas and beyond.

SUMMARY OF IMPERATIVES – OUR GUIDING PRINCIPLES

- I. DIVERSITY
- II. SERVICE
- III. STUDENT SUCCESS
- IV. STEWARDSHIP
- V. GLOBALIZATION
- VI. RESEARCH
- VII. COMMUNICATION

IMPERATIVE I – DIVERSITY

Goal 1. We will foster a culture of inclusion which attracts to our university highly qualified students, faculty, and staff who represent the diversity of the region we serve, and who will engage with us in the pursuit of our university’s vision and mission.

Strategy 1.1: Our student body, both undergraduate and graduate, will reflect the ethnic diversity of the region served by A&M-Commerce.

Strategy 1.2: A&M-Commerce will be designated a Hispanic-Serving Institution by 2015.

Strategy 1.3: The University will enhance the diversity of our faculty and staff members by implementing more aggressive recruitment efforts to increase the number of ethnic/minority faculty and staff.

Strategy 1.4: A&M-Commerce will integrate training in civility, diversity, and democratic processes in orientation for students, faculty, and staff resulting in an increase in employees who are able to communicate with a significantly diverse student body.

IMPERATIVE II – SERVICE

Goal 1. We will promote excellence in service to members of all internal and external communities.

Strategy 1.1: Improve customer service to internal and external stakeholders as evidenced by customer service satisfaction surveys that will be conducted by each unit annually and the results used for continuous improvement.

Strategy 1.2: Make information easy to access and provide the right answer or advice the first time by improving web, telephone, and personal contact with all stakeholders.

Strategy 1.3: Limit response time to inquiries and requests for assistance to within 24 hours of the request.

Strategy 1.4: Provide service to the community, region, state, and the nation as evidenced by an annual assessment of the number of employees engaged in activities and the potential impact on the economy and society.

IMPERATIVE III – STUDENT SUCCESS

Goal 1. We will pursue and implement effective, research-based strategies that provide all students the resources, support, and high-quality instruction they need to achieve their goals of earning a college degree.

Strategy 1.1: Freshman fall-to-fall retention measures will improve five percentage points from 2011 to 2015.

Strategy 1.2: Graduation rates of first-time, full-time freshman students will improve five percentage points from 2011 to 2015.

Strategy 1.3: The number of undergraduate degrees awarded from critical shortage fields which have been identified by the Texas Higher Education Coordinating Board will improve five percentage points between 2011 and 2015.

Strategy 1.4: Effective and innovative teaching strategies and a focus on student-learning outcomes will result in an increase in placement rates, a reduction in time to degree, and an improvement in graduation rates.

IMPERATIVE IV – STEWARDSHIP

Goal 1. We will advance the university by demonstrating the quality of our programs and services to an ever-expanding community of supporters. We will leverage the value of public, private, and human resources through business practices that are founded in accountability and transparency and academic practices that are continuously improved through research, assessment, and innovation.

Strategy 1.1: Create a campus culture that advances shared governance and sustains and supports operational and service excellence as evidenced by annual stakeholder surveys.

Strategy 1.2: Identify a minimum of one percent of the annual budget for reallocation to fund innovation and new initiatives.

Strategy 1.3: Maintain status as among the most affordable institutions of higher education in Texas by exercising proper fiscal stewardship and control in managing funds in direct support of its mission.

Strategy 1.4: Increase non-grant funding from external sources by 10 percent per year.

IMPERATIVE V – GLOBALIZATION

Goal 1. We will cultivate an academic environment enlivened by global interconnections that traverse the boundaries of culture, politics, and place.

Strategy 1.1: Learning outcomes described in the Quality Enhancement Plan will guide the university's continuous improvement efforts.

Strategy 1.2: Two percent of the student body will have experienced a study abroad activity by 2015.

Strategy 1.3: A minimum of one strategic partnership with an internationally recognized global entity will be established each year that results in an innovative and revenue-producing program of study.

Strategy 1.4: A minimum of two productive teaching/research collaborations will be established each year.

IMPERATIVE VI – RESEARCH

Goal 1. We will strengthen the nexus between teaching and research in ways that speak to the university’s imperative to both create and disseminate knowledge.

Strategy 1.1: A&M-Commerce will expand knowledge in fields critical to our state, nation, and interconnected world as evidenced by an annual increase in the number of scholarly publications and grants.

Strategy 1.2: The number of grant requests for external funding will increase 10 percentage points between 2011 and 2015.

Strategy 1.3: A&M-Commerce will increase the amount of externally funded research by 10 percentage points between 2011 and 2015.

Strategy 1.4: A&M-Commerce will increase the number of post-doctoral researchers by 6 between 2011 and 2015.

IMPERATIVE VII – COMMUNICATION

Goal 1. We will develop a consistent, authentic, and reliable message that effectively conveys our commitment to extending opportunity, transforming lives, and shaping futures through education.

Strategy 1.1: Build brand recognition in the Dallas/Fort Worth Metroplex that results in an increase in student enrollment from that region and aligns with specific strategic enrollment goals regarding targeted programs and student populations.

Strategy 1.2: Develop and implement marketing strategies that can be tracked to an increase in student enrollment and donations received.

CRITERION 3. STUDENT OUTCOMES

A. Student Outcomes

Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program.

The student outcomes for the Industrial Engineering program are:

- a) an ability to apply knowledge of mathematics, science, and engineering
- b) an ability to design and conduct experiments, as well as to analyze and interpret data
- c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d) an ability to function on multidisciplinary teams
- e) an ability to identify, formulate, and solve engineering problems
- f) an understanding of professional and ethical responsibility
- g) an ability to communicate effectively
- h) the broad education necessary to understand the impact of engineering solutions in a global,
- i) economic, environmental, and societal context a recognition of the need for, and an ability to engage in life-long learning
- j) a knowledge of contemporary issues
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The student outcomes are documented and available to the general public on the Industrial Engineering program page. This page is located under “programs” on the Department of Engineering & Technology home page (www.tamu-commerce.edu/iet).

The attainment of student outcomes occurs as a student progresses through the program. The attainment of a student outcome does not occur as a result of one course. Rather, it is an ongoing process as a result of the student outcomes being integrated throughout the curriculum. For example, the ability to apply knowledge of mathematics, science, and engineering is an integral part of a majority of the engineering courses and is demonstrated in a variety of ways. The level of emphasis varies from course-to-course. Table 3-1 shows a crosswalk of the student outcomes and the industrial engineering departmental courses.

The faculty establish a set of course competencies (IECCs) or course outcomes, which identify a set of skills and/or knowledge that a student is expected to attain and/or demonstrate by the end of the course. The IECCs are identified and documented in each syllabus. Each IECC is associated with one or more of the student outcomes (a-k) at some level. The association between IECCs and student outcomes are documented in an addendum to each syllabus. An example addendum is shown in Figure 3-1. Syllabi addendums for all of the department courses are provided in Appendix A.

Table 3-1: Alignment of IE Courses and the Student Outcomes (a)-(k)

IE Program Educational Objective Course	Criterion 3.(a)	Criterion 3.(b)	Criterion 3.(c)	Criterion 3.(d)	Criterion 3.(e)	Criterion 3.(f)	Criterion 3.(g)	Criterion 3.(h)	Criterion 3.(i)	Criterion 3.(j)	Criterion 3.(k)
IE 101	Blue				Blue	Blue	Blue		Yellow		
IE 201	Blue				Blue	Yellow	Green				Green
IE 207	Blue		Green		Blue	Yellow		Blue	Yellow		Blue
IE 211	Blue	Yellow			Blue	Yellow	Green				Green
IE 305	Blue	Green	Blue		Blue	Green	Yellow	Yellow		Green	Green
IE 311	Blue	Green			Blue	Yellow	Blue				Blue
IE 312	Blue	Blue	Blue		Blue	Yellow	Blue				
IE 313	Blue	Blue		Blue	Blue	Yellow	Blue	Green		Green	Blue
IE 314	Blue		Yellow		Blue	Yellow		Yellow	Yellow		Blue
IE 316	Blue	Blue	Green	Blue	Green	Green	Blue	Green	Yellow		Yellow
IE 403	Blue	Blue	Blue	Blue	Blue	Green	Blue		Yellow	Blue	Blue
IE 407	Blue		Blue		Blue	Yellow					Blue
IE 410	Blue	Blue	Blue		Blue	Yellow	Green				Blue
IE 411				Green		Blue	Blue	Green	Blue	Green	Blue
IE 431	Blue	Blue	Blue	Blue	Blue	Yellow	Blue		Yellow	Blue	Blue
IE 444	Blue		Blue	Blue	Blue	Yellow	Blue			Blue	Blue
IE 471			Blue	Blue	Blue	Green	Blue	Green	Blue	Blue	Blue
IE 486	Blue		Green	Green	Blue	Yellow	Green	Blue		Green	Blue
IE 495	Blue		Blue	Blue	Blue	Blue	Blue	Blue	Green		Blue
IT 111	Blue		Green		Green	Yellow	Yellow				Blue
IT 112	Blue	Blue	Blue	Blue	Blue	Green	Blue				Blue
IT 340				Yellow		Blue	Yellow	Green		Blue	

Content Rating Legend		Color
Not Covered in This Course		
Slight Coverage in This Course: a). General Awareness, and b) Not part of grade.		Yellow
Moderate Coverage in This Course: a). 15-30 minutes discussion or lecture for the term, and b) May be included as part of grade.]		Green
Significant Coverage in This Course: a) >30 minutes discussion plus significant exercise and/or assignment, and b) Is included as part of grade.		Blue

IE Course Competencies (IECCs)

1. Demonstrate knowledge of the role of statistics in engineering
2. Demonstrate knowledge of descriptive statistics
3. Demonstrate knowledge of probability, random variables, and their distributions
4. Demonstrate knowledge of linear functions of random variables
5. Demonstrate knowledge of sampling distributions and point estimation of parameters
6. Demonstrate knowledge of statistical intervals for a single sample

Relationship of Student Outcomes (a)-(k) to IECCs

IECCs	IE Student Outcomes	
1, 2, 3, 4, 5, 6		(a) An ability to apply knowledge of mathematics, science, and engineering
1, 2, 5, 6		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
1, 2, 3, 4, 5, 6		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
2, 5, 6		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
2, 3, 4, 5, 6		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Figure 3-1: Example Syllabus Addendum – Relationship of Student Outcomes and IECCs

B. Relationship of Student Outcomes to Program Educational Objectives

The key attributes of engineers identified by the National Academy of Engineering included strong analytical skills, practical ingenuity, creativity, good communication, leadership, high ethical standards, agility and flexibility, and lifelong learners. These attributes match the program student outcomes (a-k) closely as indicated below:

Strong analytical skills – (a), (b), (e), (k)

Practical ingenuity – (a), (b), (c), (e), (h), (k)

Creativity – (c), (e), (h), (k)

Good communication – (g)

Leadership – (c), (d), (e), (j)

High ethical standards – (f)

Agility and flexibility – (c), (d), (e), (h), (j)

Lifelong learners – (i)

The alignment of PEOs to the Academy’s key attributes was documented in Criterion 2, Section D of this report. This provides a level of evidence that the skills and knowledge attained through the student outcomes will adequately prepare an individual to achieve the program educational outcomes. Table 3-2 shows the relationship between the PEOs and student outcomes.

Table 3-2. Alignment of IE PEOs and Student Outcomes (a)-(k)

IE Program Educational Objectives	Program Educational Objectives [Matched with Criterion 3(a)-3(k)]										
	Criterion 3. (a)	Criterion 3. (b)	Criterion 3. (c)	Criterion 3. (d)	Criterion 3. (e)	Criterion 3. (f)	Criterion 3. (g)	Criterion 3. (h)	Criterion 3. (i)	Criterion 3. (j)	Criterion 3. (k)
Students will have the ability to convincingly present their solutions and to do so in the context of written, oral and electronic media.							✓				
Students will be prepared to function effectively and provide leadership with an organization as an IE professional including an ability to select and organize, facilitate, lead, coordinate and participate in teams as well as understand organizational processes and behavior.				✓		✓	✓	✓		✓	
Students will demonstrate an understanding of the need to collect, analyze, and interpret data relevant to problems arising in the IE discipline.	✓	✓	✓		✓						✓
Student will have the ability to approach and diffuse unstructured problems.	✓	✓	✓		✓						✓
Students will demonstrate an understanding of and the need to accomplish life-long growth within the field of industrial engineering profession.								✓	✓	✓	
Students will be able to utilize the methodological and computational skills to operate effectively within an IE work discipline.	✓	✓	✓		✓						✓

CRITERION 4. CONTINUOUS IMPROVEMENT

A. Program Educational Objectives

1. PEO Assessment Process

A PEO assessment process was established at program implementation. Under the original process, attainment of the PEOs was to be primarily evidenced by the results of an alumni and employer survey. The effectiveness of the process was initially impacted by the newness of the Industrial Engineering program resulting in a small number of graduates and difficulty in obtaining assessment data on graduates from employers due to legal and privacy issues. Based upon recommendations from the Industry Advisory Board and information from ABET workshops, the program faculty reviewed, revised, and re-implemented a modified PEO assessment process in Spring 2009.

Under the current process, four different assessment instruments are utilized to assess the attainment of the PEOs: 1) Graduating Senior Exit Survey, 2) 1st-Year Alumni Survey, 3) 2-4 Year Alumni Survey, and 4) Employer Survey.

Graduating Senior Exit Survey

By definition, students are expected to attain the Student Outcomes by the time of graduation, not the PEOs. The Exit Survey asks graduating seniors to rate the level they feel prepared to achieve the PEOs, not whether they have attained them. Given this fact, corrective action will not be taken for PEOs based solely upon the results of the Exit Survey. However, the results provide a baseline on how graduating seniors perceive their ability to attain the PEOs.

A 5-point Likert scale is used to assess the student's feeling of preparedness to attain each PEO. The survey is administered annually in the Spring semester prior to graduation.

1st-year Alumni Survey

The influence of an undergraduate education on the attainment of the PEOs is assumed to be at the highest level during the first year of work. After an individual has been employed or out of the program for longer period of times, the impact of industry training and other life experiences begin to take on a more significant role and it becomes difficult to attribute success in PEO attainment directly to the undergraduate program. Possible exceptions include PEOs #2 and #5, which are related to leadership roles and engagement in life-long learning respectively. For these two areas, a more accurate measure often occurs after the graduates have worked for a number of years.

This is the first of two alumni surveys. A 5-point Likert scale is used to assess the student's level of attainment of each PEO. The survey is administered annually in the

Spring, one year following graduation. Qualitative data are obtained through open-ended questions, which supplement the quantitative analyses.

The results from the 1st-year Alumni Survey and Graduating Senior Exit Survey are compared, which indicates the differences in perception versus actually attaining PEOs for the same study group. This provides an opportunity to identify potential areas for program improvement and/or enhancement, even if the 1st-year alumni report they have attained a PEO. The following identifies potential outcomes from the analyses:

<u>Exit Survey</u>	<u>1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If a trend persists in which the 1 st -year achievement level is lower than the expectation level from the Exit survey, this may indicate an area in the program that could be strengthened or enhanced. If deemed necessary, action will be taken to improve the program/student outcomes.

2-4 year Alumni Survey

This is the second of two alumni surveys. A 5-point Likert scale is used to assess the student's level of attainment of each PEO. Students are asked to assess their attainment level of each PEO. The survey is administered on a three year cycle in the Spring. The study population includes alumni who graduated 2-4 years prior to the time the survey is conducted. Qualitative data are obtained through open-ended questions, which will supplement the quantitative analyses.

The results from the 2-4 year Alumni Survey and 1st-year Alumni Survey are compared. This provides an opportunity to identify potential areas for program improvement and/or enhancement, even if both study groups report they have attained a PEO. The following identifies potential outcomes from the analyses:

<u>1st-year Alumni Survey</u>	<u>2-4 year Alumni Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No additional corrective action required. Action taken as a result of the Exit Survey / 1 st -year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If a trend persists in which the 2-4 year achievement level is lower than the 1 st year survey, this may indicate an area in the program that could be strengthened or enhanced. If deemed necessary, action will be taken to improve the program/student outcomes.

Employer Survey

Legal and privacy issues often limit or prohibit employers from providing information on specific employees, which impacted the effectiveness of the original PEO assessment process. Rather than assessing individuals, the Industry Advisory Board recommended employers assess cohorts of industrial engineering graduates from A&M-Commerce. Recognized limitations of this approach include fewer employer responses, due to the fact companies only submit one survey rather than obtaining data from each hiring manager, and the study population cannot be broken down into graduation cohorts for direct comparison.

A 5-point Likert scale is used to assess the cohort's level of attainment of each PEO. The survey is administered on a three year cycle in the Spring. The study population can include alumni who graduated in any year since the program was implemented. Qualitative data are obtained through open-ended questions, which will supplement the quantitative analyses.

The results from the Employer Survey and 2-4 year Alumni Survey are compared. This provides an opportunity to identify potential areas for program improvement and/or enhancement, even if both groups report graduates have attained a PEO. The following identifies potential outcomes from the analyses:

<u>2-4 year Alumni Survey</u>	<u>Employer Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No additional corrective action required. Action taken as a result of the 1 st -year/2-4 year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If a trend persists in which the employer survey achievement level is lower than the 2-4 year survey, this may indicate an area in the program that could be strengthened or enhanced. If deemed necessary, action will be taken to improve the program/student outcomes.

The full PEO assessment process is represented graphically in Figure 4-1.

2. PEO Assessment Process Timeline

Elements of PEO assessment are conducted annually but the complete assessment process is on a three year cycle. The timeline for the PEO Assessment process is provided both in Table 2-1 and Table 4-1. Assessment data were collected under the old process but survey points are not shown in the table.

Table 4-1: PEO Assessment Cycle

	Spr '09	Spr '10	Spr '11	Spr '12	Spr '13	Spr '14	Spr '15	Spr '16	Spr '17
Graduating Senior Exit Survey	√	√	√	√	√	√	√	√	√
1 st -Year Alumni Survey		√	√	√	√	√	√	√	√
2-4 Year Alumni Survey		√			√			√	
Employer Survey	√			√			√		

A formal review of the PEOs is tied to the Employer Survey cycle, unless circumstances dictates it be done on a higher frequency.

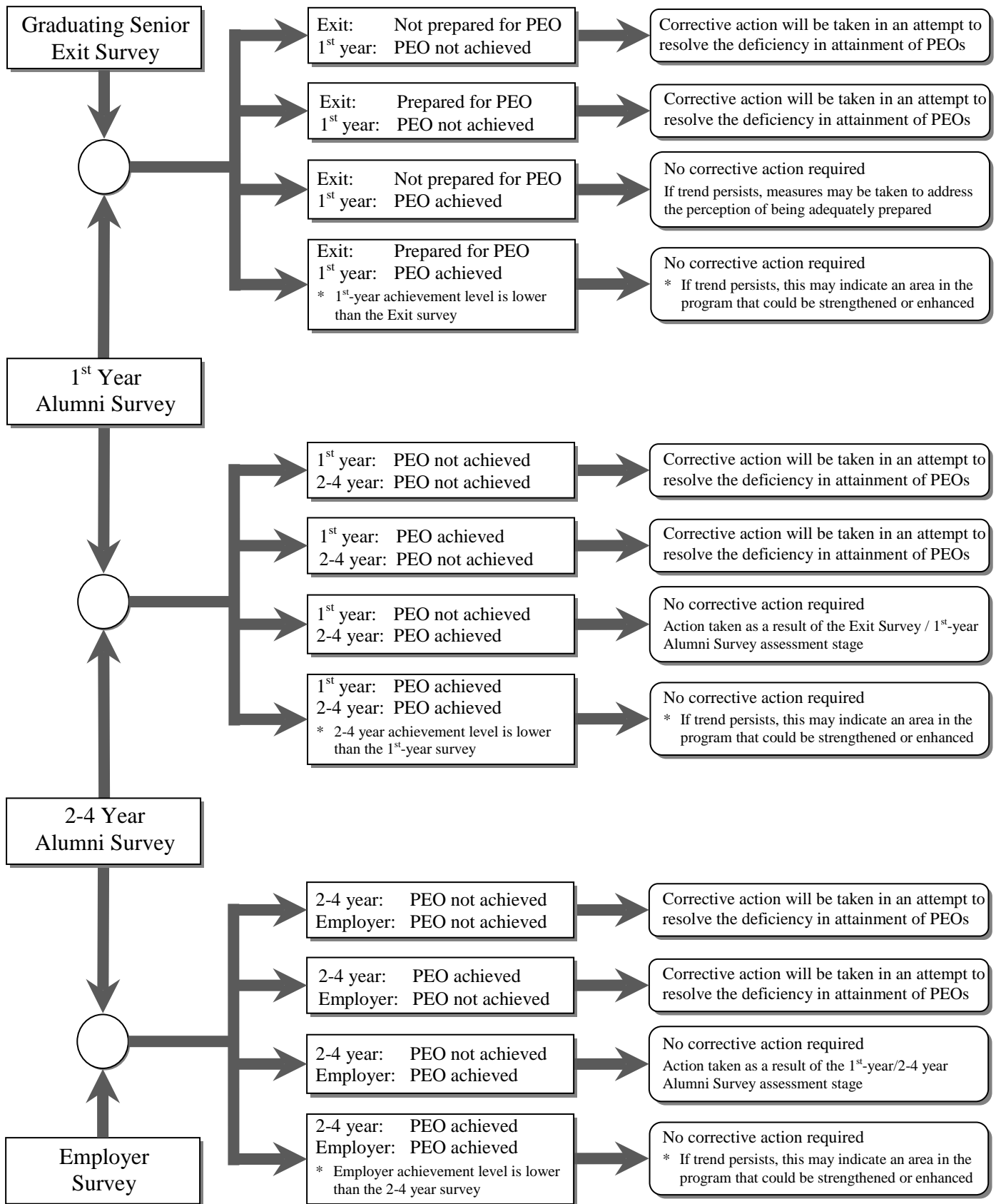


Figure 4-1: Program Educational Objectives Assessment Process

3. PEO Expected Level of Attainment

It is the expectation that collectively, each survey study population will indicate attainment of each PEO, which the exception of the graduating seniors. The expectation on the Graduate Exit Survey is the study population will indicate the perceived ability to attain each PEO. Based upon a 5-point Likert scale, one measure of attainment is when the average value of the responses for a given PEO is 3 or higher and the median response value is 3 or higher. This is reflected in the charts in Section 1, PEO Assessment Process, in this chapter.

An additional measure of attainment is obtained through the comparative analyses. It is expected as alumni gain experience in their field, their self-declared level of achievement will increase. Thus, the trend in the average response value for 2-4 year alumni for a given PEO should be higher than the 1-year alumni response value. If a trend persists in which a more experienced cohort has a lower achievement level, it may indicate an area in the program that could be strengthened or enhanced. This is the case even if both study populations indicate achievement of a PEO independently. This is reflected in the charts in Section 1, PEO Assessment Process, in this chapter.

4. PEO Evaluation Process

Program faculty review and interpret the PEO assessment data, both quantitative and qualitative, to determine if any action related to program improvement is required.

Quantitative Evaluation:

PEO #1: Ability to convincingly present solutions and to do so in the context of written, oral, and electronic media.

2009 Graduating Senior Exit & 2010 1st Year Alumni Surveys

<u>2009 Exit Survey</u>	<u>2010 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required.

2009 Senior Exit Survey: $\bar{x}=3.83$, Median = 4

2010 1st Year Alumni Survey: $\bar{x}=4.67$, Median = 5

2010 Graduating Senior Exit & 2011 1st Year Alumni Surveys

<u>2010 Exit Survey</u>	<u>2011 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required.

2010 Senior Exit Survey: $\bar{x}=4.33$, Median = 4

2011 1st Year Alumni Survey: $\bar{x}=4.5$, Median = 4.5

2007* 1st Year Alumni & 2010 2-4 Year Alumni Surveys

(*Under the revised assessment process, 2010 2-4 Year Alumni survey data would have been compared to 2006-2009 1st Year Alumni survey responses. The revised assessment process was implemented in 2009. As part of the process, 1st Year Alumni surveys are conducted annually. Prior to 2009, this was not the case so the only alumni data available was a result of a 2007 alumni survey.)

<u>2007 1st-year Alumni Survey</u>	<u>2010 2-4 year Alumni Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No additional corrective action required. Action taken as a result of the Exit Survey / 1 st -year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required.

2007 Alumni Survey: $\bar{x}=4.13$, Median = 4

2010 2-4 Year Alumni Survey: $\bar{x}=4.88$, Median = 5

2010 2-4 Year Alumni & 2009 Employer Surveys

<u>2-4 year Alumni Survey</u>	<u>Employer Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No additional corrective action required. Action taken as a result of the 1 st -year/2-4 year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required. If a trend persists in which the employer survey achievement level is lower than the 2-4 year survey, this may indicate an area in the program that could be strengthened or enhanced* . If deemed necessary, action will be taken to improve the program/student outcomes.

2010 2-4 Year Alumni Survey: \bar{x} =4.88, Median = 5

2009 Employer Survey: \bar{x} =3.5, Median = 4

*The employer achievement levels are lower than the 2-4 year alumni levels. This will be monitored to determine if this trend persists in future assessment cycles.

PEO #2: Function effectively and provide leadership with an organization as an IE professional including ability to select and organize, facilitate, lead, coordinate, and participate in teams as well as understand organizational processes and behavior.

2009 Graduating Senior Exit & 2010 1st Year Alumni Surveys

<u>2009 Exit Survey</u>	<u>2010 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required.

2009 Senior Exit Survey: \bar{x} =4.00, Median = 4

2010 1st Year Alumni Survey: \bar{x} =4.33, Median = 5

2010 Graduating Senior Exit & 2011 1st Year Alumni Surveys

<u>2010 Exit Survey</u>	<u>2011 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If a trend persists in which the 1st-year achievement level is lower than the Exit survey, this may indicate an area in the program that could be strengthened or enhanced. If deemed necessary, action will be taken to improve the program/student outcomes.

2010 Senior Exit Survey: $\bar{x}=4.33$, Median = 4

2011 1st Year Alumni Survey: $\bar{x}=4.00$, Median = 4

**The 1st year alumni achievement levels are lower than the perceived graduating senior levels. This will be monitored to determine if this trend persists in future assessment cycles.*

2007* 1st Year Alumni & 2010 2-4 Year Alumni Surveys

*(*Under the revised assessment process, 2010 2-4 Year Alumni survey data would have been compared to 2006-2009 1st Year Alumni survey responses. The revised assessment process was implemented in 2009. As part of the process, 1st Year Alumni surveys are conducted annually. Prior to 2009, this was not the case so the only alumni data available was a result of a 2007 alumni survey.)*

<u>2007 1st-year Alumni Survey</u>	<u>2010 2-4 year Alumni Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No additional corrective action required. Action taken as a result of the Exit Survey / 1 st -year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required.

2007 Alumni Survey: $\bar{x}=4.00$, Median = 4

2010 2-4 Year Alumni Survey: $\bar{x}=4.50$, Median = 5

2010 2-4 Year Alumni & 2009 Employer Surveys

<u>2-4 year Alumni Survey</u>	<u>Employer Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No additional corrective action required. Action taken as a result of the 1 st -year/2-4 year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required. If a trend persists in which the employer survey achievement level is lower than the 2-4 year survey, this may indicate an area in the program that could be strengthened or enhanced* . If deemed necessary, action will be taken to improve the program/student outcomes.

2010 2-4 Year Alumni Survey: \bar{x} =4.88, Median = 5

2009 Employer Survey: \bar{x} =4.25, Median = 4.5

*The employer achievement levels are lower than the 2-4 year alumni levels. This will be monitored to determine if this trend persists in future assessment cycles.

PEO #3: Understanding of and need to collect, analyze, and interpret data relevant to problems arising in the IE discipline.

2009 Graduating Senior Exit & 2010 1st Year Alumni Surveys

<u>2009 Exit Survey</u>	<u>2010 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required.

2009 Senior Exit Survey: \bar{x} =3.83, Median = 4

2010 1st Year Alumni Survey: \bar{x} =4.38, Median = 5

2010 Graduating Senior Exit & 2011 1st Year Alumni Surveys

<u>2010 Exit Survey</u>	<u>2011 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If a trend persists in which the 1st-year achievement level is lower than the Exit survey, this may indicate an area in the program that could be strengthened or enhanced. If deemed necessary, action will be taken to improve the program/student outcomes.

2010 Senior Exit Survey: $\bar{x}=4.33$, Median = 4

2011 1st Year Alumni Survey: $\bar{x}=4.00$, Median = 4

**The 1st year alumni achievement levels are lower than the perceived graduating senior levels. This will be monitored to determine if this trend persists in future assessment cycles.*

2007* 1st Year Alumni & 2010 2-4 Year Alumni Surveys

*(*Under the revised assessment process, 2010 2-4 Year Alumni survey data would have been compared to 2006-2009 1st Year Alumni survey responses. The revised assessment process was implemented in 2009. As part of the process, 1st Year Alumni surveys are conducted annually. Prior to 2009, this was not the case so the only alumni data available was a result of a 2007 alumni survey.)*

<u>2007 1st-year Alumni Survey</u>	<u>2010 2-4 year Alumni Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No additional corrective action required. Action taken as a result of the Exit Survey / 1 st -year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required.

2007 Alumni Survey: $\bar{x}=3.88$, Median = 4

2010 2-4 Year Alumni Survey: $\bar{x}=4.13$, Median = 4.5

2010 2-4 Year Alumni & 2009 Employer Surveys

<u>2-4 year Alumni Survey</u>	<u>Employer Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No additional corrective action required. Action taken as a result of the 1 st -year/2-4 year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. .

2010 2-4 Year Alumni Survey: $\bar{x}=4.13$, Median = 4.5

2009 Employer Survey: $\bar{x}=4.25$, Median = 4.5

PEO #4: Ability to approach and diffuse unstructured problems.

2009 Graduating Senior Exit & 2010 1st Year Alumni Surveys

<u>2009 Exit Survey</u>	<u>2010 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required.

2009 Senior Exit Survey: $\bar{x}=3.75$, Median = 4

2010 1st Year Alumni Survey: $\bar{x}=4.44$, Median = 5

2010 Graduating Senior Exit & 2011 1st Year Alumni Surveys

<u>2010 Exit Survey</u>	<u>2011 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required.

2010 Senior Exit Survey: $\bar{x}=4.00$, Median = 4

2011 1st Year Alumni Survey: $\bar{x}=4.00$, Median = 4

2007* 1st Year Alumni & 2010 2-4 Year Alumni Surveys

(*Under the revised assessment process, 2010 2-4 Year Alumni survey data would have been compared to 2006-2009 1st Year Alumni survey responses. The revised assessment process was implemented in 2009. As part of the process, 1st Year Alumni surveys are conducted annually. Prior to 2009, this was not the case so the only alumni data available was a result of a 2007 alumni survey.)

<u>2007 1st-year Alumni Survey</u>	<u>2010 2-4 year Alumni Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No additional corrective action required. Action taken as a result of the Exit Survey / 1 st -year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required.

2007 Alumni Survey: $\bar{x}=4.00$, Median = 4

2010 2-4 Year Alumni Survey: $\bar{x}=4.75$, Median = 5

2010 2-4 Year Alumni & 2009 Employer Surveys

<u>2-4 year Alumni Survey</u>	<u>Employer Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No additional corrective action required. Action taken as a result of the 1 st -year/2-4 year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required. If a trend persists in which the employer survey achievement level is lower than the 2-4 year survey, this may indicate an area in the program that could be strengthened or enhanced* . If deemed necessary, action will be taken to improve the program/student outcomes.

2010 2-4 Year Alumni Survey: \bar{x} =4.75, Median = 5

2009 Employer Survey: \bar{x} =4.00, Median = 4.5

*The employer achievement levels are lower than the 2-4 year alumni levels. This will be monitored to determine if this trend persists in future assessment cycles.

PEO #5: Understanding of and the need to accomplish life-long growth within the field of industrial engineering profession.

2009 Graduating Senior Exit & 2010 1st Year Alumni Surveys

<u>2009 Exit Survey</u>	<u>2010 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required.

2009 Senior Exit Survey: \bar{x} =3.75, Median = 4

2010 1st Year Alumni Survey: \bar{x} =4.44, Median = 5

2010 Graduating Senior Exit & 2011 1st Year Alumni Surveys

<u>2010 Exit Survey</u>	<u>2011 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If a trend persists in which the 1st-year achievement level is lower than the Exit survey, this may indicate an area in the program that could be strengthened or enhanced. If deemed necessary, action will be taken to improve the program/student outcomes.

2010 Senior Exit Survey: $\bar{x}=4.33$, Median = 4

2011 1st Year Alumni Survey: $\bar{x}=4.00$, Median = 4

**The 1st year alumni achievement levels are lower than the perceived graduating senior levels. This will be monitored to determine if this trend persists in future assessment cycles.*

2007* 1st Year Alumni & 2010 2-4 Year Alumni Surveys

*(*Under the revised assessment process, 2010 2-4 Year Alumni survey data would have been compared to 2006-2009 1st Year Alumni survey responses. The revised assessment process was implemented in 2009. As part of the process, 1st Year Alumni surveys are conducted annually. Prior to 2009, this was not the case so the only alumni data available was a result of a 2007 alumni survey.)*

<u>2007 1st-year Alumni Survey</u>	<u>2010 2-4 year Alumni Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No additional corrective action required. Action taken as a result of the Exit Survey / 1 st -year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required.

2007 Alumni Survey: $\bar{x}=3.88$, Median = 4

2010 2-4 Year Alumni Survey: $\bar{x}=4.38$, Median = 4

2010 2-4 Year Alumni & 2009 Employer Surveys

<u>2-4 year Alumni Survey</u>	<u>Employer Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No additional corrective action required. Action taken as a result of the 1 st -year/2-4 year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required. If a trend persists in which the employer survey achievement level is lower than the 2-4 year survey, this may indicate an area in the program that could be strengthened or enhanced* . If deemed necessary, action will be taken to improve the program/student outcomes.

2010 2-4 Year Alumni Survey: \bar{x} =4.38, Median = 4

2009 Employer Survey: \bar{x} =4.00, Median = 4

*The employer achievement levels are lower than the 2-4 year alumni levels. This will be monitored to determine if this trend persists in future assessment cycles.

PEO #6: Ability to utilize the methodological and computational skills to operate effectively within an IE work discipline.

2009 Graduating Senior Exit & 2010 1st Year Alumni Surveys

<u>2009 Exit Survey</u>	<u>2010 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required.

2009 Senior Exit Survey: \bar{x} =3.92, Median = 4

2010 1st Year Alumni Survey: \bar{x} =4.44, Median = 5

2010 Graduating Senior Exit & 2011 1st Year Alumni Surveys

<u>2010 Exit Survey</u>	<u>2011 1st-year Alumni Survey</u>	<u>Action / Outcome</u>
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Prepared ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Prepared ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If the trend persists, measures may be taken to address the perception of graduating seniors of being adequately prepared.
Prepared ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required. If a trend persists in which the 1st-year achievement level is lower than the Exit survey, this may indicate an area in the program that could be strengthened or enhanced. If deemed necessary, action will be taken to improve the program/student outcomes.

2010 Senior Exit Survey: $\bar{x}=4.33$, Median = 4

2011 1st Year Alumni Survey: $\bar{x}=4.00$, Median = 4

**The 1st year alumni achievement levels are lower than the perceived graduating senior levels. This will be monitored to determine if this trend persists in future assessment cycles.*

2007* 1st Year Alumni & 2010 2-4 Year Alumni Surveys

*(*Under the revised assessment process, 2010 2-4 Year Alumni survey data would have been compared to 2006-2009 1st Year Alumni survey responses. The revised assessment process was implemented in 2009. As part of the process, 1st Year Alumni surveys are conducted annually. Prior to 2009, this was not the case so the only alumni data available was a result of a 2007 alumni survey.)*

<u>2007 1st-year Alumni Survey</u>	<u>2010 2-4 year Alumni Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3)	Not Achieved ($\bar{x} \leq 3$, (Median<3)	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No additional corrective action required. Action taken as a result of the Exit Survey / 1 st -year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3)	Achieved ($\bar{x} \geq 3$, (Median>3)	No corrective action required.

2007 Alumni Survey: $\bar{x}=4.00$, Median = 4

2010 2-4 Year Alumni Survey: $\bar{x}=4.75$, Median = 5

2010 2-4 Year Alumni & 2009 Employer Surveys

<u>2-4 year Alumni Survey</u>	<u>Employer Survey</u>	<u>Action / Outcome</u>
Not Achieved ($\bar{x} \leq 3$, (Median<3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Achieved ($\bar{x} \geq 3$, (Median>3))	Not Achieved ($\bar{x} \leq 3$, (Median<3))	Corrective action will be taken to develop and/or improve program/student outcomes in an attempt to resolve the deficiency in attainment of PEOs.
Not Achieved ($\bar{x} \leq 3$, (Median<3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No additional corrective action required. Action taken as a result of the 1 st -year/2-4 year Alumni Survey assessment stage.
Achieved ($\bar{x} \geq 3$, (Median>3))	Achieved ($\bar{x} \geq 3$, (Median>3))	No corrective action required. If a trend persists in which the employer survey achievement level is lower than the 2-4 year survey, this may indicate an area in the program that could be strengthened or enhanced* . If deemed necessary, action will be taken to improve the program/student outcomes.

2010 2-4 Year Alumni Survey: \bar{x} =4.75, Median = 5

2009 Employer Survey: \bar{x} =4.00, Median = 4

*The employer achievement levels are lower than the 2-4 year alumni levels. This will be monitored to determine if this trend persists in future assessment cycles.

Qualitative Evaluation:

Each survey includes open ended questions related to job placement, program improvement, and program enhancement. Responses to each question are grouped by subject and survey type (e.g. 1st year alumni, 2-4 year alumni) to allow trends or common themes across cohorts to be easily detected by program faculty. Table 4-2 provides a sample portion of the qualitative data collected from the Graduating Senior Exit survey.

Table 4-2: Sample Qualitative Data from the Graduating Senior Exit Survey

<u>What three things would you do to improve the quality of the IE program?</u>
<ul style="list-style-type: none"> - Offer (IE) 486 online - More online course - More courses offered online - I think there should be more online classes for lecture based classes - Lecture style classes should be online
<ul style="list-style-type: none"> - More “real life” examples - More industry examples - There needs to be more hands-on classes and/or interaction with the industry - Get students more involved in actual industry scenarios - Less lecture, more hands-on experience and real life examples - More hands on learning, field experience (going on tours of factories)
<ul style="list-style-type: none"> - Better career help/advice for graduating seniors - A resume workshop for IEs - More industry partners for internships - Engage more large companies in North Texas to present during Engineering Week - More internship opportunities
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="display: flex; align-items: center;"> Spring 2009 (n=12) </div> <div style="display: flex; align-items: center;"> Spring 2010 (n=3) </div> <div style="display: flex; align-items: center;"> Spring 2011 (n=6) </div> </div>

In the previous example, multiple students expressed a desire for online instruction but it was only from one graduating cohort. This view was not shared by the subsequent graduating classes. On the other hand, more experiential learning was recommended by all three cohorts. Areas of consensus, especially if the same theme is seen in the results from other surveys, are considered when action plans to improve or enhance the program are derived. Specific examples are provided in Section C, Continuous Improvement, in this chapter.

5. PEO Assessment/Evaluation Documentation

The PEO Assessment process and timeline are defined in a departmental document, which is available in an electronic and hardcopy format. The process and assessment tools were developed by the program faculty and the documentation is maintained by the Department Head.

Survey results are entered into a database and retained for historical records. The data is used to generate charts and tables, like those shown in the previous two sections, which are used during the annual faculty evaluation meeting. Meeting minutes are generated to document the decisions made as a result of the evaluation. These records are available in a hardcopy and electronic format.

B. Student Outcomes

1. Student Outcome Assessment Process

Student Outcomes (Criterion 3(a) – (k)) describe the skills, knowledge, and behaviors students acquire as they progress through the program. Attainment of a given student outcome does not occur as a result of a single course. Rather, it is an ongoing process as a result of the student outcomes being integrated throughout the curriculum. For example, 3(a) the ability to apply knowledge of mathematics, science, and engineering is an integral part of a majority of the engineering courses and is demonstrated in a variety of ways. The level of emphasis for the student outcomes varies from course-to-course. Table 3-1 and Table 4-3 (same tables) show the alignment of industrial engineering departmental courses and the level of instructional focus for each student outcome.

Faculty establish a set of course competencies (IECCs) or course outcomes for each course, which identify a set of skills and/or knowledge that a student is expected to attain and/or demonstrate by the end of the course. The IECCs are identified and documented in each syllabus. Each IECC is associated with one or more of the student outcomes (a-k) at some level. The association between IECCs and student outcomes is shown in Figure 4-2 and are documented in an addendum to each syllabus. An example addendum is shown in Figure 3-1. Syllabi addendums for all of the departmental program courses are provided in Appendix A.

Table 4-3: Alignment of IE Courses and the Student Outcomes (a)-(k)

IE Program Educational Objective / Course	Criterion 3.(a)	Criterion 3.(b)	Criterion 3.(c)	Criterion 3.(d)	Criterion 3.(e)	Criterion 3.(f)	Criterion 3.(g)	Criterion 3.(h)	Criterion 3.(i)	Criterion 3.(j)	Criterion 3.(k)
IE 101	Blue				Blue		Blue		Yellow		
IE 201	Blue				Blue	Yellow	Green				Green
IE 207	Blue		Green		Blue	Yellow		Blue	Yellow		Blue
IE 211	Blue	Yellow			Blue	Yellow	Green				Green
IE 305	Blue	Green	Blue		Blue	Green	Yellow	Yellow		Green	Green
IE 311	Blue	Green			Blue	Yellow	Blue				Blue
IE 312	Blue	Blue	Blue		Blue	Yellow	Blue				
IE 313	Blue				Blue	Yellow	Blue	Green		Green	Blue
IE 314	Blue		Yellow		Blue	Yellow		Yellow	Yellow		Blue
IE 316	Blue	Blue	Green	Blue	Green	Green	Blue	Green	Yellow		Yellow
IE 403	Blue	Blue	Blue		Blue	Green	Blue		Yellow	Blue	Blue
IE 407	Blue		Blue		Blue	Yellow					Blue
IE 410	Blue	Blue	Blue		Blue	Yellow	Green				Blue
IE 411				Green		Blue	Blue	Green	Blue	Green	Blue
IE 431	Blue	Blue	Blue	Blue	Blue	Yellow	Blue		Yellow	Blue	Blue
IE 444	Blue		Blue	Blue	Blue	Yellow	Blue			Blue	Blue
IE 471			Blue	Blue	Blue	Green	Blue	Green	Blue	Blue	Blue
IE 486	Blue		Green	Green	Blue	Yellow	Green	Blue		Green	Blue
IE 495	Blue		Blue	Blue	Blue	Blue	Blue	Blue	Green		Blue
IT 111	Blue		Green		Green	Yellow	Yellow				Blue
IT 112	Blue	Blue	Blue	Blue	Blue	Green	Blue				Blue
IT 340				Yellow		Blue	Yellow	Green		Blue	

Content Rating Legend		Color
Not Covered in This Course		
Slight Coverage in This Course: a). General Awareness, <u>and</u> b) Not part of grade.		Yellow
Moderate Coverage in This Course: a). 15-30 minutes discussion or lecture for the term, <u>and</u> b) May be included as part of grade.]		Green
Significant Coverage in This Course: a) >30 minutes discussion plus significant exercise and/or assignment, <u>and</u> b) Is included as part of grade.		Blue

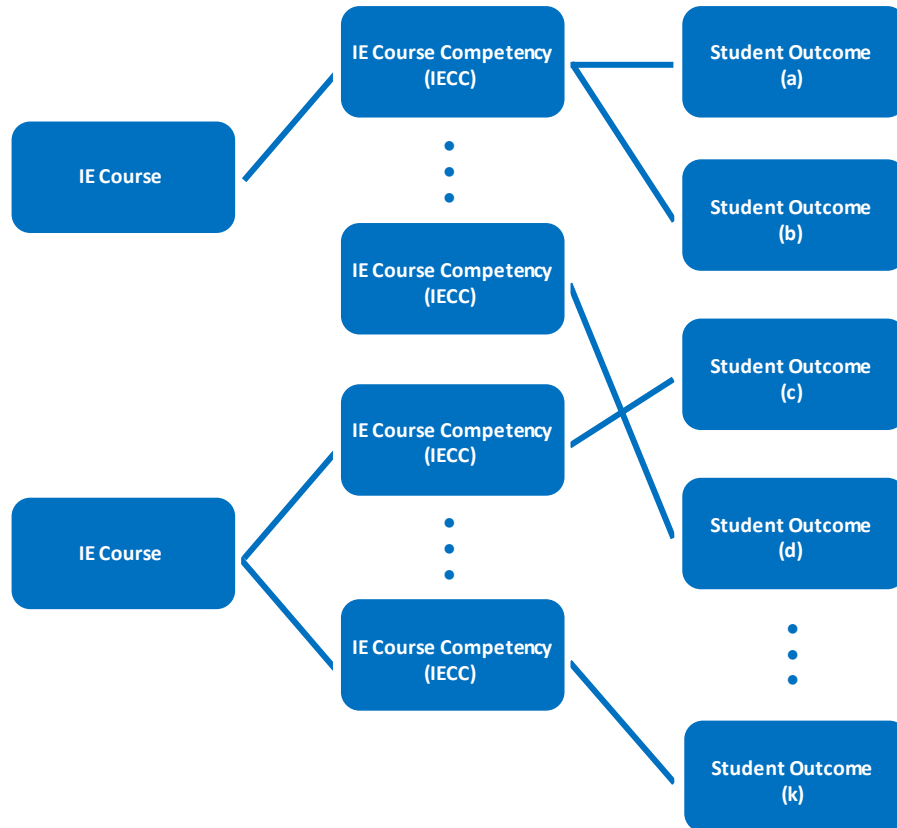


Figure 4-2: Student Outcomes (a)-(k) / Curriculum Alignment Model

The Assessment Process in the Industrial Engineering program at A&M–Commerce is comprised of the following elements: (i) Identification of the desired Student Outcomes (SOs) and the IE Course Competencies (IECCs), (ii) Relationship between the IE Student Outcomes and the IE Course Competencies, (iii) Collection and analysis of evidence that the IE program incorporates these Student Outcomes and IE Course Competencies into a Continuous Improvement Process, (iv) Continuous Improvement Assessment and Action Feedback. All these elements are practiced within the IE Program and have been in place since Fall 2004.

- i. Identification of the desired IE Student Outcomes (SOs) and the IE Course Competencies (IECCs)

The Student Outcomes are directly related to the ABET Criterion 3 outcomes 3(a)-3(k). The SOs are as follows:

- a)** An ability to apply knowledge of mathematics, science, and engineering
- b)** An ability to design and conduct experiments, as well as to analyze and interpret data
- c)** An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

- d) An ability to function on multi-disciplinary teams
- e) An ability to identify, formulate, and solve engineering problems
- f) An understanding of professional and ethical responsibility
- g) An ability to communicate effectively
- h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i) A recognition of the need for, and an ability to engage in life-long learning
- j) A knowledge of contemporary issues
- k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

ii. Relationship between the Student Outcomes and the IE Course competencies (IECCs)

The IE Student Outcomes (IESOs) are reflected in the IE course-level course competencies (IECCs). IECCs by IE courses are mapped to each of the Criterion 3(a)-3(k), as shown in Table 4-3.

iii. Collection and analysis of evidence that the IE Program incorporates Student Outcomes and IE Course Competencies into a Continuous Improvement Process

It is the responsibility of the individual program faculty members to ensure that each IE course provide key elements of the overall IE curriculum requirements plus give the IE student the opportunity to achieve the key IECCs from each course. As a continuous improvement process, the faculty member is able to use “close – the – loop” process to better adapt the IE course’s characteristics and presentations such that the Student Outcomes, 3(a)-3(k), measured thru IE Course Competencies (IECCs) are met.

The collection and analysis of these course assessments are facilitated through the use of Course-Embedded Assessment Process (CEAP) where the individual performance parameters (e.g. IECCs) for each IE course are assessed at the end of each course. The CEAP was first implemented in the IE program beginning the Fall Semester 2004. The intent of the Course-Embedded Assessment Process is to focus on a structured evaluation and assessment method which will provide a constructive review of the student performance beyond the course grade determination. The process calls for each faculty member to measure the degree of student attainment of the individual IECCs by course.

To illustrate the mechanics of CEAP, an actual embedded assessment report for IE 411, Engineering Management, course taught Fall 2010 is shown in Figure 4-3. The IE faculty member tracks and tabulates the student achievements of the IECCs for each course. The data of the students’ performance is generally retrieved from the student performance records for the course. The faculty member has their own method on how each IECC will be defined and data to be measured and collected during the semester. The data to support the measurements of these IECCs

parameters may be a specific examination score, a score of a specific set of problems or questions from an examination or from several examinations, or student presentation score, or results of a student team effort. Once these IECCs are defined, a specific student/IECC performance will be quantitatively evaluated. The students' performance parameters are recorded in a table similar to Figure 4-3, Course Embedded-Assessment Report. The individual score for an IECC may be as simple as the ratio of the value a student earns for a problem to the value of the problem if correctly solved on the examination. If the student answers the problem correctly, the student would receive a competency value, 100%, for that specific IECC. The report shows the score for each student in the class by IECC and an overall IECC score for the class. Note in this report, the achievement for each IECC has been tabulated per IECC. If a student's performance for a given IECC is at least 70%, the given IECC is considered met by the student. The number of students that met the IECC is compared to total number of students in the class. This percentage represents the degree of attainment of the individual IECCs for the class. An IECC with at least 70% of the students in class meeting the IECC is considered met by the class. In Figure 4-3, IECCs scores highlighted with green color background indicates the IECCs (#1, #5, #8 and #9) have been met by the class. In the IE 411 case, IECC's (#2, #3, #4, #6, and #7) scores are highlighted with a yellow color background, indicating these IECCs were met by 50% to 70% of the students. Scores with red color background indicates that less than 50% of the class met the IECCs. In this IE 411 course, there were no IECCs that had a score less than 50%. IECC #10 was not calculated since the material for this competency was not covered during class because there was a shortage of class time. A table similar to Figure 4-3 is tabulated for each discipline specific course.

iv. Continuous Improvement Assessment and Action Feedback

Figure 4-4 provides the Continuous Improvement Assessment and Action Feedback form for IE 411, Engineering Management, taught in Fall 2010. The feedback form enables the faculty member to assess the positive, neutral and negative aspects of the course and helps identify a plan of action to implement changes into future course offerings to better meet student outcomes and educational objects.

Texas A&M University-Commerce <i>Industrial Engineering & Technology Department</i> <i>Continuous Improvement in Engineering Education</i>	
Course Number: IE 411	Semester: _Fall 2010
Course Title: Engineering Management	Instructor: E. Delbert Horton, Ph.D., P.E.
Official course enrollment: 12	
Grade summary: A _1__ B _6__ C _4__ D __ F __ X __ Dropped _1__	
Number of times you have taught this course: 1 2 to 4 more than 5	
What changes, if any, did you make to this course since you last taught it? Less time spent on organization types ---used the available time to acquaint students with the accounting cost of engineering projects and how corporation track these cost through the Accounting and Information systems. Seemed to work better but lost class time and did not cover material for Competency #10. .	
Which objectives were met by 70% or more of the students? 1. demonstrate the role of teaming in an industrial environment 5. understand the importance of risk, cost, schedule and resource control and management of a project 8. write clear goal and objective statements and establish measurable criteria for project success 9. verbalize and apply an understanding of the risk management process	
Which objectives were not met by 70% or more of the students? 2. identify and use the tools of project management 3. effectively use project reporting tools and techniques 4. understand and appraise the changing business climate and how the changes have impacted project management 6. understand the need for effective project management skills, training and the specific training needs of project managers 7. demonstrate an understanding of the role of Project Management vs. Functional Management	
Did not have enough class time to cover Competency 10. 10. encourage and exposures to examples and cases of engineering ethics (emphasis of the global influence of this issue)	
What plans, if any, do you have to improve the course the next time? Allocate class time to cover Competency 10, encourage and exposure to examples and cases of engineering ethics (emphasis of the global influence of this issue).	
Used a Case Study for final examination---good results in fall 2009-- students enjoyed this type of examination	
Continue from fall 2009 recommendations -----Spend more time on structuring projects with the WBS and the project plans (includes resources vs. time schedule using project costs as parameter of success. Students have a hard time in getting their thoughts and plans together for organizing a project.----the next difficult effort for the student is to plan or schedule how a project leader schedules the several resources to accomplish the job without costing the project with resources need conflicts.	
_____ Instructor	_____ Date

Figure 4-4: Sample Continuous Improvement Assessment Form

2. Student Outcome Assessment Process Timeline

The industrial engineering course competencies, which are linked to the Student Outcomes, are assessed at the end of the semester the course is taught. With the exception of the computer-aided design course, the departmental IE courses are offered one time a year. A portion of the Student Outcome assessment is conducted each semester but the complete assessment process is on an annual cycle.

3. Student Outcome Expected Level of Attainment

It is the expectation that at least seventy percent of the students will demonstrate proficiency of each IECC at the course level. The expected level of attainment for each of the student outcomes is at least 70 percent on a course level.

4. Summaries of the results of the evaluation process

Each IE discipline specific course is evaluated as described in this section. Embedded Assessment reports and Continuous Improvement Assessment forms are created for each course and reviewed by the faculty. Copies of each the results are included in the course ABET notebooks which will be available for review during the site visit.

5. Student Outcome Assessment/Evaluation Documentation

ABET notebooks are generated for each departmental course. The notebooks include, 1) syllabus, 2) textbook information, 3) laboratory assignment / materials, 4) course notes and reference materials, **5) embedded assessment**, 6) continuous improvement and self assessment, 7) quizzes and examinations, 8) term papers and projects, and 9) sample student work. The results of the student outcome evaluation are documented in the embedded assessment spreadsheet, which is provided in section 5 of the notebook. The documentation is available in a hardcopy and electronic format. The ABET notebooks will be available for review during the site visit.

C. Continuous Improvement

The previous sections provided the evaluation process for PEOs and Student Outcomes. Results of the evaluation are part of the program continuous improvement process. The following examples resulted from the evaluation processes.

1. Course Revision

IE 101, Introduction to Industrial Engineering is a course taken in the first semester of the IE program.

IECCs through the Fall 2007 semester (August-December):

1. Knowledge of the traits of a successful engineer, engineering societies, professional registration, and the definition of industrial engineering

2. Knowledge of engineering ethics and their application
3. Knowledge of engineering problem-solving methods and techniques
4. Knowledge of the engineering design method
5. Knowledge of communication methods and applications
6. Knowledge of number notation and significant digits
7. Skill in linear interpolation and the use of software to prepare tables and graphs
8. Skill in the SI units and unit conversion
9. Familiarity with the Industrial Engineering curriculum
10. Familiarity with the location and purpose of the Industrial Engineering and Technology laboratories (equipment and computer)

During the several years of teaching this curriculum, some issues emerged. First, the curriculum was not preparing students for the different approaches to thinking required in the core mathematics-based Industrial Engineering courses after the freshman year. Specifically, students were having a difficult time with the engineering economy, probability and statistics, and operations research (more specifically, linear programming) courses. Students were getting behind at the start of these courses as they struggled with the new approaches to thinking and the corresponding mathematics. For the rest of the semester they tried to play catch-up, with some of them not succeeding at rates higher than 50% in some offerings of these courses. This was determined based upon the results of the embedded assessment (IECCs) from the affected courses.

Second, Industrial Engineering courses after the freshman year had evolved to the point where they were covering quite a bit of this curriculum at a time when students were more prepared to understand it better. For example, all but the second learning objective was covered at least partially in the sophomore-level Excel and Minitab course, which had Calculus I as a prerequisite.

Lastly, the curriculum was not showing any benefits in retaining students as Industrial Engineering majors. Of the 28 students who completed the Fall 2007 offering of the course, only six, or 21.429%, have remained Industrial Engineering majors. The other 22 included two of the highest-performing students, both of whom initially changed their majors to Mathematics.

The IE 101 course instruction initiated a meeting with program faculty to discuss the evaluation results and propose a change to the IECCs. The faculty developed and approved the following IECCs, which were presented to the Industry Advisory Board in the Spring 2008 meeting.

IECCs starting with the Fall 2008 semester (August-December):

1. Demonstrate knowledge of Industrial Engineering, related Web sites at the authors' university, and engineering ethics
2. Demonstrate introductory knowledge of matrices
3. Demonstrate introductory knowledge of linear programming
4. Demonstrate introductory knowledge of engineering economy
5. Demonstrate introductory knowledge of discrete mathematics

6. Demonstrate introductory knowledge of probability and statistics

Of the ten learning objectives from the previous curriculum, part of the first and all of the second, third, ninth, and tenth were in the first learning objective of the new curriculum. The revised course curriculum showed improvements in the recruiting, preparation, and retention of the industrial engineering majors.

2. Course Revision

The IE internship course, IE 471, and Industrial Systems Design (IE capstone course), IE 495, were in the original IE program curriculum to introduce and provide the senior engineering student an insight into the industrial world. These two courses were evaluated by faculty according to the continuous improvement plan for ABET and changes were recommended by the program faculty, which were made effective in fall semester 2009.

The two courses selected to present this real engineering application to the student were:

IE 471, Engineering Internship, three semester hours course----- Occupational experience in an industrial facility. Work experience is cooperatively planned by the department and employer to fulfill the student's objectives. Weekly conferences, assignments and reports required. Application for internship course must be made 30 days before registration (contact department office for applications). Prerequisite: IE major, junior standing and consent of professor.

IE 495, Industrial Systems Design, four semester hours course---- Systems design, flexible manufacturing systems and manufacturing integration; integrates knowledge gained from all required industrial engineering courses in a system design project; for students in their final semester of undergraduate studies. Prerequisites: IE major, senior classification (final semester of undergraduate studies), and consent of professor.

The IE 471 Internship was offered to give the senior IE student an occupational experience in an industrial facility. After several years executing with this senior portion of the IE curriculum, the students and faculty experienced several disappointing obstacles in executing this IE 471 internship, including students being unable to convince industry to hire them for an internship course. The students at A&M - Commerce are generally nontraditional students. They are generally older students with family and other responsibilities in addition to their education goals. They are generally working 40 hours per week to support the family and meeting a full-time student curriculum. These students are reluctant to give up their current employment to work for one semester as an intern. These internships are at minimum wage without benefits for the student and his/her family. In addition, the student's current job may not be available when they return after internship. The disappointments the faculty experience stem from students requesting the faculty advisor to consider using their current job responsibilities as their internship. For example, the student may be working as a sales clerk at a cell phone retail

store. This position would have no engineering problems or experience. Based on these issues, the IE faculty began to focus on the development and implementation of a replacement course for the IE 471 Internship course.

As stated earlier, from the outset, the faculty members and the industrial advisors expected the curriculum would have a senior semester design project course. Research showed that many schools have established and been successful with this curriculum approach.

The original curriculum provided for conducting a one four semester hour IE 495 Industrial Systems Design course. During a semester (15 weeks duration), each student team (3 to 4 students per team) in the capstone course had the following course deliverables:

- proposal preparation and presentation to the industry client and faculty advisors, and
- the execution of the proposed engineering project during the same semester

Individual project deliverables included a mid-semester design review, a project status reporting/control, a final design presentation, and a final written report. For the preparation of these deliverables, a very short time period remained within the semester to adequately conduct the execution of the project: analysis, design and a validation phase of the final product or process. The inadequate time provided to accomplish each task resulted in a stressful experience for both the students and the professors. During these project times, the supervising professor observed how the students dropped applying their analytical thought process to the project. The students literally jumped into a panic flow to complete the deliverables without performing systematic engineering tradeoffs and analyses. This is a critical learning period for students and ultimately they are the ones that are hurt when the applications and processes are not fleshed out and acted upon thoroughly.

During the spring 2006, the industry sponsor of a specific project was a third party logistics company. The team and the industry sponsor decided to narrow the scope of work to a single facet of the sponsor's operation. With only four weeks remaining, the reduced work was going to difficult to achieve. This put the team in a very awkward position because without completing the reduced work, the sponsor would not have much value added from the students' efforts.

To implement this model a variety of assessment tools were required at each step. These assessment tools included student, faculty and employer surveys, in-class evaluations as well as peer-to-peer evaluations and other related feedback vehicles. The authors used this assessment model to address the previously mentioned issues with IE 471 and IE 495.

Armed with an intimate understanding of the operational issues and concerns that faced the faculty during the early years of Industrial Engineering program, the faculty presented their concerns about the IE 471 Internship course to the Industry Advisory Board (IAB). The IAB encouraged faculty members to reexamine and re-evaluate the IE program and

decide how to improve the program's curriculum. The resulting effort undertaken by the IE faculty curriculum committee determined that creating an effective alternate path for an improved industrial experience would be beneficial to the success of the program, faculty and most of all the students. Taking this new approach allowed the current internship requirement to be eliminated. Once the prohibitive obstacles facing the IE students and faculty advisors with the internship requirement are removed, the number of IE majors should increase, which in turn will enable the IE program to realize an improvement in student retention.

After considering various options, the IE curriculum faculty committee with the approval of the Industry Advisory Board made the decision to convert the IE 471 Internship Course into a Plan Development for Industrial System Design Course. The new IE 471 course is a three (3) semester hour course offered to senior IE students during their fall semester prior to a spring graduation. IE 471 is a prerequisite for the IE 495 Industrial System Design course offered during the following spring semester.

This plan called for IE 471 to accomplish dual objectives: 1) to deliver a face to face course directed towards leadership, and team dynamics training (based on recommendations from other schools program having a leadership and team dynamics training), and 2) to prepare as a deliverable, a proposal for the industrial system design engineering project to be executed in the IE 495 Industrial System Design course during the following spring semester. Having the IE 471 class the previous semester to properly prepare a proposal for the project should allow the teams more time to actually conduct the project and sufficient time for preparation of the deliverables in the IE 495 System Design course. Also, the IE 495 course structure was modified to allow for more of the previously mentioned value-added engineering efforts (e.g. systematic engineering tradeoffs and analyses) to be realized during the students' final senior semester. The two revised courses used to present this real engineering application to the students are:

IE 471, Planning for Industrial Systems Design, three (3) semester hours course-----
This course has a component of leadership and team dynamics training. A key deliverable of this course is for the students to demonstrate and experience the positive effects of team dynamics. The second deliverable of the course is for the students to prepare as a deliverable a proposal for the industrial system design project to be executed in the next semester IE 495 Industrial System Design course.

IE 495, Industrial Systems Design, four (4) semester hours course---- System design project may vary in objectives. The following are a few of these projects. 1) layout of new facilities, 2) perform a lean study using the results to design and implement a software package to realize a leaner process, 3) design and develop a material handling subsystem for a new fruit juice bottling system and manufacturing integration. Knowledge gained from the required industrial engineering courses gives the student the tools and approaches to design and analyze a system design project.

The new sequenced courses have been implemented for two years. Feedback from the industry sponsors indicated students are better prepared to execute the project. The extra time has resulted in more thorough analyses and improved deliverables. In addition, the industry sponsor becomes better acquainted with the students and their capabilities. As evidence, the first year of the revised sequence, resulted in multiple students from the project teams receiving full-time offers from the sponsoring company.

3. Program Enhancement

Four different assessment instruments are utilized to assess the attainment of the PEOs: 1) Graduating Senior Exit Survey, 2) 1st-Year Alumni Survey, 3) 2-4 Year Alumni Survey, and 4) Employer Survey. The alumni surveys include a quantitative and qualitative piece. Results from the qualitative analyses indicated student desire more networking and exposure to the industry partners.

In response to the alumni and current student input, a partnership was established with L3 Communications to provide students with the opportunity to gain invaluable work experience. Interdisciplinary student teams work on real-world engineering projects sponsored by L3. Participation is voluntary. Department faculty serve as project mentors and interact with the industry partner on a regular basis throughout the semester.

The first project was run during the Spring 2011 semester. Seven students were interviewed and selected for the project team. The project culminated in multiple students being hired into paid internship positions.

4. Future Enhancements

Based on faculty knowledge of and experience with benchmarked IE programs, feedback from graduating seniors and alumni, and posted IE career opportunities, it has been proposed to add an Information Systems course to the IE curriculum, starting in Spring 2012. This will be accomplished by combining the Work Design and Human Factors courses into a single course and adding the new Information Systems course.

D. Additional Information

Copies of the assessment instruments and evaluation data referenced in this chapter will be available for review at the time of the visit. Other information such as minutes from meetings where the assessment results were evaluated and where recommendations for action were made will also be included.

CRITERION 5. CURRICULUM

A. Program Curriculum

1. Plan of Study

Table 5-1 describes the plan of study for students in the B.S. Industrial Engineering program. The courses are listed in a recommended schedule by year and term (4 year, 8 semesters). A&M-Commerce is on the semester system. The average section enrollment is shown for all courses in the program for a 2-year period, with the exception of the Physical Education (2), Humanities, and Visual/Performing Arts electives. Students select from a group of courses each elective and the enrollments vary between courses.

Humanities (3 sh from the following):

ENG 2326, 200, 202, 2331; HIST 264 or 265; JOUR 1307; PHIL 1301, 331, 332, 360, 362; PSCI 410, 411, 412; RTV 1335, SPC 201

Visual and Performing Arts (3 sh from the following):

ART 1301, 1303, 1304, 227, 240, 250, 304, 307; ENG 432, 434; MUS 1310, 1308; PHO 111; THE 1310, 340, 440

Fitness and Recreational Activity (2 fitness and recreational activity courses)

Two Fitness and Recreational Activity (FRA) courses are required. Varsity Sports and marching band may be utilized to fulfill all or part of this requirement.

Under the Engineering Topics column, the symbol (✓) is used to indicate a significant design element is integrated into the course. The ABET definition from the *2011-2012 Criteria for Accrediting Engineering Programs*, Criterion 5(b) was as the standard for assessing whether a course included a significant design element.

Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.

2. Curriculum / PEO Alignment

A curriculum design process is initiated with a needs assessment to determine if there is sufficient demand for the program and its graduates. Given the demand, input from key constituents results in a set of general characteristics and/or attributes employers expect graduates to attain and demonstrate (PEOs). The skills, knowledge, or behaviors a student should possess at the time of graduation (student outcomes) are then established in conjunction with stakeholders. These outcomes provide a foundation deemed necessary in order for an individual to attain the predetermined attributes. A curriculum pattern is created by mapping the outcomes to specific courses and developing course

competencies (IECCs). Figure 5-1 shows a graphical representation of the relationship between the Program Educational Outcomes and the program curriculum.

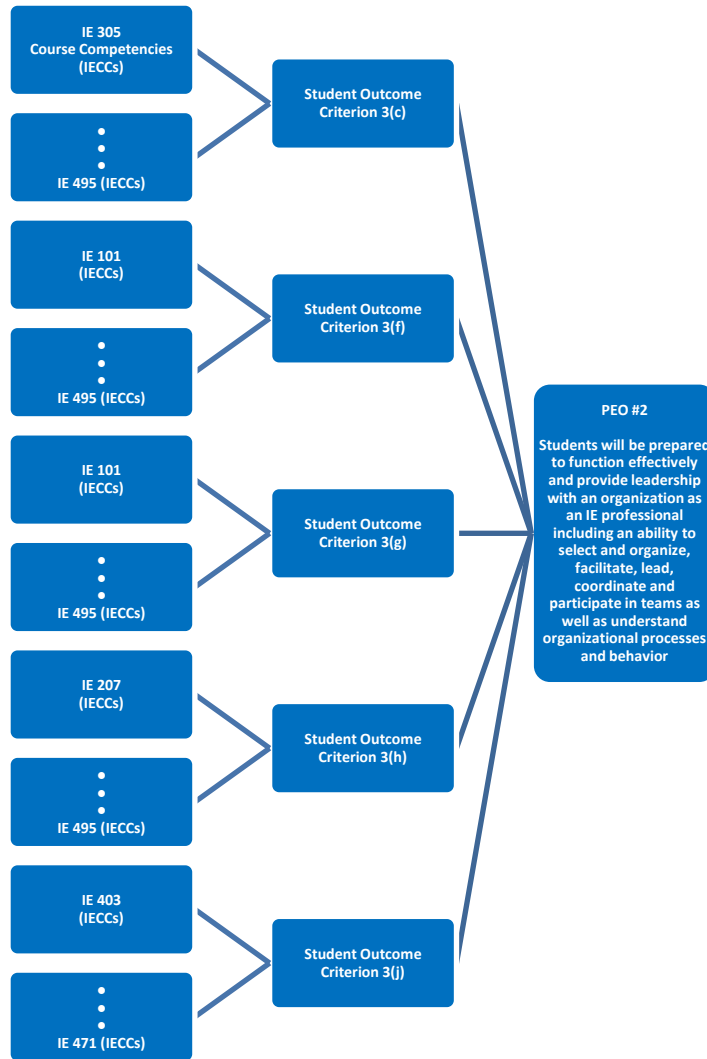


Figure 5-1: PEO / Curriculum Alignment Model

The level of detail required to fully demonstrate the relationship between the PEOs and the program curriculum could not be shown in Figure 5-1. The full alignment for each PEO can be determined from tables and figures in the Criterion 3: Student Outcomes chapter, as shown in Figure 5-2.

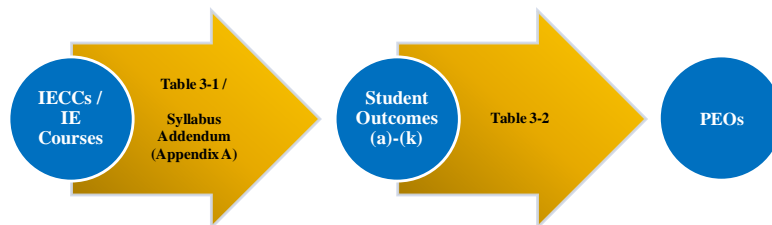


Figure 5-2: IE Curriculum Alignment with Program Educational Objectives

3. Curriculum / Student Outcome Alignment

The curriculum and prerequisite structure exist to provide the best opportunity for students to be successful in completing courses and ultimately the degree. Prerequisites are established to ensure the student has attained the necessary skills and/or knowledge to be successful in a sequenced course. The program sequence and prerequisites are established by the faculty. IE course competencies (IECCs) feed into student outcomes (a)-(k), which in turn support the attainment of the Program Educational Objectives as shown in Figures 5-1 and 5-2.

4. Program Prerequisite Structure

The prerequisite structure for the Industrial Engineering program is shown in Figure 5-3. The curriculum flowchart is also shown in Attachment 1-1, under the Criterion 1: Students chapter.

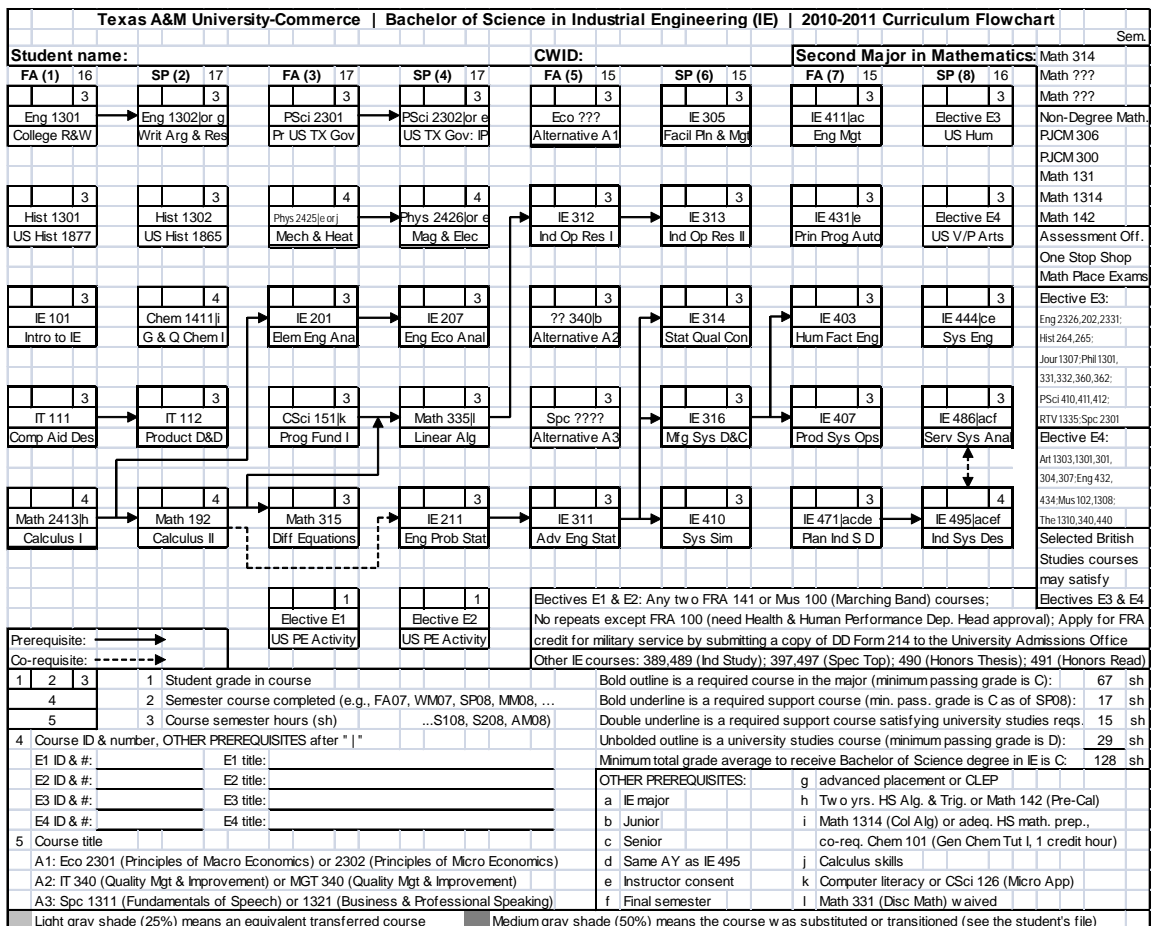


Figure 5-3: Bachelor of Science in Industrial Engineering Curriculum Flowchart

5. Program Hours and Depth of Study

Criterion 5, Curriculum, in the ABET 2011-2012 *Criteria for Accrediting Engineering Programs* manual documents the general requirements for any engineering curriculum. The Industrial Engineering program at A&M-Commerce meets these requirements as evidenced by the following:

Note: *One year is the lesser of 32 semester hours (or equivalent) or one-fourth of the total credits required for graduation.* Industrial Engineering is a 128 hour degree so one year equates to 32 semester hours.

(a) *one year of a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences.*

The Industrial Engineering program includes 32 hours (1 year) of mathematics and basic sciences as shown in Table 5-1. The Chemistry course and both university Physics courses have laboratories, which provide experimental experience.

(b) *one and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the student's field of study. The engineering sciences have their roots in mathematics and basic sciences but carry knowledge further toward creative application. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other. Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.*

The Industrial Engineering program includes 62 hours (2 years) of engineering courses as shown in Table 5-1. The symbol (✓) is used to indicate a course with a significant design element, as defined above.

(c) *a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.*

Every public college and university in Texas is required by law to have a **core curriculum** of at least 42 credit hours. The intent of the core is to provide a set of courses common to any baccalaureate degree. The required components of the core include communications, mathematics, natural sciences, humanities, visual/performing arts, US history, political science, and social/behavioral science. The core curriculum at A&M-Commerce is referred to a University Studies. The University Studies requirements are listed in the university undergraduate catalog at: <http://catalog.tamu-commerce.edu/content.php?catoid=14&navoid=521>

The Industrial Engineering program satisfies the university studies requirement as shown in Table 5-1. The University Studies was designed to offer students flexibility in selecting courses that align with their individual educational goals. Specific courses are required from each category to ensure students take courses appropriate for and consistent with the technical content of the IE program. The University Studies for the IE program includes:

Communications (9 hours)

ENG 1301, 1302, SPC 1315 or 1321

Mathematics (3 hours)

MATH 2413* (Calculus I)

Natural Sciences (8 hours)

PHYS 2425*, PHYS 2426* (University Physics)

Social & Behavior Sciences (15 hours)

HIST 1301, HIST 1302, PSCI 2301, PSCI 2302, ECO 2301 or 2302

Humanities (3 hours)

Select from approved university studies courses

Visual/Performing Arts (3 hours)

Select from approved university studies courses

Fitness & Recreational Activity (Two 1 hour courses)

Select from approved university studies courses

**Calculus I and the two University Physics courses meet the curriculum mathematics and basic sciences requirements as well as the University Studies. They are noted and shown in both columns in Table 5-1.*

Students must be prepared for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.

The Industrial Engineering program culminates in a major design experience in the sequenced courses IE 471 and IE 495. A description of the design experience is provided in the following section (6).

The discipline specific curriculum requirements are listed under the heading Program Criteria for Industrial and Similarly Named Engineering Programs in the *2011-2012 Criteria for Accrediting Engineering Programs* manual.

The curriculum must prepare graduates to design, develop, implement, and improve integrated systems that include people, materials, information, equipment and energy. The curriculum must include in depth instruction to accomplish the integration of systems using appropriate analytical, computational, and experimental practices.

The ABET discipline specific requirements provided above are consistent with the Student Outcome criteria (a – k). As an example, the requirement for the design of integrated systems that include people, materials, information, equipment, and energy aligns with student outcome criteria (c). Table 4-3 shows the relationship between program courses and the student outcomes.

The Professional Engineering (PE) examination is designed to test an individual’s competency in a given engineering discipline. The following provides evidence the Industrial Engineering curriculum aligns with the industrial engineering discipline.

IE PE Exam Category	IE Program Courses
1. Facilities Engineering & Planning	IE 305, IE 431
1. Systems Analysis & Design	IE 207, IE 313, IE 410, IE 444, IT 112
2. Logistics	IE 316, IE 407, IE 411, IE 444
4. Work Design	IE 316, IE 403
5. Ergonomics & Safety	IE 316, IE 403
6. Quality Engineering	IE 211, IE 311, IE 314, IT 340

6. Major Design Experience

In relation to need for a senior design experience, the Criterion 5 section of the *2011-2012 Criteria for Accrediting Engineering Programs*, states:

Students must be prepared for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.

This requirement is met through two sequenced design courses, which provide students with the opportunity to apply engineering design principles to an actual industrial application. This design experience is project-based, with the project being defined in conjunction with an industry sponsor(s). The IE 471/IE 495 sequence is shown in Figure 5-4.

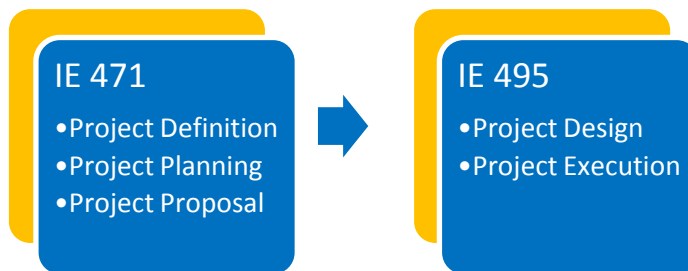


Figure 5-4: IE Senior Design Experience

a) **IE 471, Plan for Industrial Systems Design (3 semester hours)**

This is the first course in the senior design sequence. This course focuses on the planning and proposal phases of the design process. The project is team-based so a component of leadership and team dynamics is integrated into the curriculum. The two objectives of the course include: 1) to deliver a face-to-face course directed towards leadership and team dynamics training and 2) to prepare as a project plan including technical design, project management plan/schedule and a cost budget for the industrial system design engineering project to be executed in the IE 495. IE 495, Industrial System Design, is taken in the semester following IE 471.

The IE 471 class is divided into teams, which generally include three to four IE students. Dependent on the nature of the project and the sponsor's willingness to allow multiple teams, a competition between teams is most desired. Each student team prepares their own project proposal and is responsible for the execution of the projects and preparing the requested project deliverables. The instructor assumes the role of coach and evaluator. The project teams continue through the project execution in the IE 495 course. This adds another dimension to the learning experience. The continuation of the project forces a level of accountability during the proposal phase, knowing elements must be implemented during the execution phase. This gives the students a realistic experience in engineering practice and tradeoffs.

b) **IE 495, Industrial Systems Design (4 semester hours).**

This is the second course in the senior design sequence. This course focuses on the execution phase of the design process. At the beginning of each IE471/IE 495 project, the industry sponsor will present a top level overview of the project. The teams are expected to gather relevant information and data from the industry client and to translate this information into system requirements and specifications. With the systems requirements and specifications approved by the sponsor, the team concentrates on an initial design and iterations of said design supported with the analyses. The student team members rely on skills and knowledge attained during their undergraduate program to complete the design/execution phase.

The systems design project is designed in conjunction with an industry sponsor(s) and varies each semester. Examples of past projects include 1) layout of new facilities, 2) perform a lean study using the results to design and implement a software package to realize a leaner process, and 3) design and develop a material handling subsystem for a new fruit juice bottling system and manufacturing integration. Knowledge gained from the required industrial engineering courses gives the student the tools and approaches to design and analyze a system design project.

The two course sequence is critical, as it allows a team sufficient time for planning, preparation, and execution of the project, which cannot be accomplished at the same level in a single course.

7. Cooperative Education

Cooperative education is not a program requirement and is not allowed to satisfy curricular requirements. Students engage in a “real world” design experience and are exposed to industry through the senior design experience described in the previous section.

8. Review Materials Available During the Site Visit

The following materials will be available for review during the visit to demonstrate achievement related to this criterion.

- **Course Notebooks:** A course notebook is generated for each discipline specific course (IE/IT) at the end of each semester. The notebooks include a 1) syllabus, 2) textbook information, 3) laboratory assignments & related materials, 4) course notes & reference materials, 5) embedded assessment, 6) continuous improvement/self assessment, 7) quizzes & examinations, and 8) examples of student work. Course notebooks from the academic year being evaluated will be available.
- **Sample Textbooks:** Textbooks from discipline specific courses (IE/IT) will be available.
- **Sample documentation from senior design projects** (IE 471/IE 495)

B. Course Syllabi

A copy of a syllabus for each course used to satisfy the mathematics, science, and discipline specific requirements required by Criterion 5 are provided in Appendix A. If a common syllabus is not used, a syllabus for each section is included in the Appendix. For discipline specific courses, an addendum is also included, which shows the alignment of the IE courses and the student outcomes (a)-(k).

Table 5-1 Curriculum

Bachelor of Science in Industrial Engineering

Course (Department, Number, Title) List all courses in the program by term starting with first term of first year and ending with the last term of the final year. (Semester System)			Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE. ²	Curricular Area (Credit Hours)				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Average Section Enrollment for the Last Two Terms the Course was Offered ¹
				Math & Basic Sciences	Engineering Topics Check if Contains Significant Design (✓)	General Education	Other		
Fall 1	ENG 1301	College Reading & Writing	R			3		F'10/Spr'11	22
Fall 1	HIST 1301	US History to 1877	R			3		F'10/Spr'11	35
Fall 1	IE 101	Introduction to Industrial Engineering	R		3			F'09/F'10	50
Fall 1	IT 111	Computer-Aided Design	R		3			F'10/Spr'11	26
Fall 1	MATH 2413	Calculus I	R	4 ¹		4 ¹		F'10/Spr'11	31
Spring 1	ENG 1302	Written Argument & Research	R			3		F'10/Spr'11	20
Spring 1	HIST 1302	US History from 1865	R			3		F'10/Spr'11	33
Spring 1	CHEM 1411	General & Quantitative Chemistry I	R	4				F'10/Spr'11	Lec 87/ Lab 15
Spring 1	IT 112	Product Design & Development	R		3(✓)			Spr'10/Spr'11	20
Spring 1	MATH 192	Calculus II	R	4				F'10/Spr'11	25
Fall 2	PSCI 2301	Principles of US & Texas Government	R			3		F'10/Spr'11	40
Fall 2	PHYS 2425	University Physics I (Mechanics & Heat)	R	4 ¹		4 ¹		F'10/Spr'11	Lec 27/ Lab 13
Fall 2	IE 201	Elementary Engineering Analysis	R		3			F'09/F'10	26
Fall 2	CSCI 151	Programming Fundamentals I	R	3				F'10/Spr'11	28
Fall 2	MATH 315	Differential Equations	R	3				F'09/F'10	32
Fall 2	Physical Education Elective		SE			1		F'10/Spr'11	*

Course (Department, Number, Title) List all courses in the program by term starting with first term of first year and ending with the last term of the final year. (Semester System)	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE. ²	Curricular Area (Credit Hours)				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Average Section Enrollment for the Last Two Terms the Course was Offered ¹
		Math & Basic Sciences	Engineering Topics Check if Contains Significant Design (✓)	General Education	Other		
Spring 2 PSCI 2302 US & Texas Gov: Institutions & Policies	R			3		F'10/Spr'11	38
Spring 2 PHYS 2426 University Physics II (Magnetism & Electric)	R	4 ¹		4 ¹		F'10/Spr'11	12
Spring 2 IE 207 Engineering Economy Analysis	R		3			Spr'10/Spr'11	28
Spring 2 MATH 335 Linear Algebra	R	3				Spr'10/Spr'11	31
Spring 2 IE 211 Engineering Probability & Statistics	R	3				Spr'10/Spr'11	29
Spring 2 Physical Education Elective	SE			1		F'10/Spr'11	*
Fall 3 ECO 2301 Principles of Macroeconomics OR ECO 2302 Principles of Microeconomics	SE			3		F'10/Spr'11 F'10/Spr'11	38 / 50
Fall 3 IE 312 Industrial Operations Research I	R		3(✓)			F'09/F'10	15
Fall 3 IT 340 Quality Management & Improvement OR MGT 340 Quality Management & Improvement	SE		3			F'09/F'10 F'10/Spr'11	25 / 11
Fall 3 SPC 1315 Fundamentals of Speech OR SPC 1321 Business & Professional Speaking	SE			3		F'10/Spr'11 F'10/Spr'11	Lec 66/Lab 20 27
Fall 3 IE 311 Advanced Engineering Statistics	R		3			F'09/F'10	12
Spring 3 IE 305 Facilities Planning & Management	R		3(✓)			Spr'10/Spr'11	9
Spring 3 IE 313 Industrial Operations Research II	R		3(✓)			Spr'10/Spr'11	11
Spring 3 IE 314 Statistical Quality Control	R		3			Spr'10/Spr'11	9
Spring 3 IE 316 Manufacturing Systems Design & Control	R		3			Spr'10/Spr'11	11
Spring 3 IE 410 Systems Simulation	R		3(✓)			Spr'10/Spr'11	10

Course (Department, Number, Title) List all courses in the program by term starting with first term of first year and ending with the last term of the final year. (Semester System)	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE. ²	Curricular Area (Credit Hours)				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Average Section Enrollment for the Last Two Terms the Course was Offered ¹
		Math & Basic Sciences	Engineering Topics Check if Contains Significant Design (✓)	General Education	Other		
Fall 4 IE 411 Engineering Management	R		3			F'09/F'10	11
Fall 4 IE 431 Principles of Programming Automation	R		3(✓)			F'09/F'10	14
Fall 4 IE 403 Human Factors Engineering	R		3(✓)			F'09/F'10	4
Fall 4 IE 407 Production Systems Operation	R		3(✓)			F'09/F'10	5
Fall 4 IE 471 Planning for Industrial Systems Design	R		3(✓)			F'09/F'10	5
Spring 4 Humanities Elective	SE			3		F'10/Spr'11	*
Spring 4 Visual/Performing Arts Elective	SE			3		F'10/Spr'11	*
Spring 4 IE 444 Systems Engineering	R		3(✓)			Spr'10/Spr'11	5
Spring 4 IE 486 Service Systems Analysis	R		3			Spr'10/Spr'11	5
Spring 4 IE 495 Industrial Systems Design	R		4(✓)			Spr'10/Spr'11	5
<i>*Student select from a specified group of courses. The enrollment varies depending upon the course selected.</i>							
TOTALS-ABET BASIC-LEVEL REQUIREMENTS			32¹	64	44¹	0	
OVERALL TOTAL CREDIT HOURS FOR THE DEGREE							
PERCENT OF TOTAL			25.0%¹	48.6%	34.4%¹	0%	
Total must satisfy either credit hours or percentage	Minimum Semester Credit Hours		32 Hours	48 Hours			
	Minimum Percentage		25%	37.5 %			

1. For courses that include multiple elements (lecture, laboratory, recitation, etc.), indicate the average enrollment in each element.
2. Required courses are required of all students in the program, elective courses are optional for students, and selected electives are courses where students must take one or more courses from a specified group.

Instructional materials and student work verifying compliance with ABET criteria for the categories indicated above will be available during the campus visit.

CRITERION 6. FACULTY

A. Faculty Qualifications

The Industrial Engineering program instruction is delivered by six faculty, including three full-time industrial engineering faculty, one department head, and two adjunct instructors. Qualifications, including academic and industry experience are summarized in Table 6-1. Appendix B contains curriculum vitae for each faculty who currently teach IE courses or technology courses in the program.

The IE faculty bring unique experiences and expertise to the program. Including the department head, the full-time faculty have over 40 years of industry experience in the fields of industrial manufacturing, semiconductor manufacturing, aerospace, and signal processing. The years of industry experience exceed 70 when the adjunct faculty are included. The primary areas of statistical analysis / process improvement, manufacturing, and operations research are easily supported with the expertise and experience of the faculty. Combining real-world experience with over 40 years of teaching experience, provides a rich learning environment for industrial engineering students.

Of the six teaching staff, two hold a Ph.D. in Industrial Engineering, one holds a Ph.D. in Electrical Engineering, one holds a Doctor of Education, and the two adjunct faculty have an earned Master of Science degree in Industrial Technology and Technology Management. Two faculty are licensed professional engineers. In addition, certifications as a Program Management Professional (PMP) and American Society for Quality (ASQ) Certified Quality Engineer (CQE) are held by the faculty.

B. Faculty Workload

Texas A&M University Policy *12.03.99.R0.01, Faculty Workload*, provides guidelines regarding the workload of the faculty. Section 2.1.1 of the policy states that the normal long term teaching assignment should be twelve (12) semester credit hours for a full-time faculty member. Department heads are given a reduced teaching load due to administrative duties. Table 6-2 shows the courses taught by the faculty over the past academic year. The average teaching load for the full-time IE faculty was 11 credit hours in the Fall semester and 10.3 credit hours in the Spring semester. The policy provides for “workload equivalencies”, which can reduce the teaching load. The department head initiates the request for a workload equivalency, which is reviewed and approved by the dean and then forwarded to the provost for final approval. Workload equivalency requests for faculty advising and working on joint projects with industry have been approved for IE faculty in the past.

Section 3.0 in the *Faculty Workload* policy states “The primary duty of faculty members is to teach. Research and/or developmental activities are expected and indispensable parts of the regular workload of all permanent faculty.” The distribution of teaching, research and

scholarly activity, and service is defined at the college level. For a tenure track faculty, the distribution is 40-40-20, as shown in Table 6-2. For a non-tenure faculty member, the distribution is 60-20-20. For the department head, the split is 20-20-10 for teaching, research, and service with an additional 50 percent for administrative responsibilities.

C. Faculty Size

The Industrial Engineering program instruction is delivered by six faculty, including three full-time industrial engineering faculty, one department head, and two adjunct instructors. There are 19 discipline specific courses (IE) required in the industrial engineering program. In addition, there are three industrial technology support courses (IT) required. Including the department head, the faculty is adequately sized to teach every IE course when offered once a year. Additional faculty lines and/or adjuncts will have to be added when the program demand cannot be accommodated by the annual course offering schedule.

Adjuncts are used to cover the multiple sections of the computer-aided design course (IT 111), as well as one section of the freshman level product design and development course (IT 112). A total of 5 course sections were taught by adjuncts during the past year. However, the adjunct that covered 4 out of the 5 sections is a full-time staff member in the department. His primary role is safety officer / technology assistant for the department. He teaches evening courses as an adjunct. This is important as the evening sections offer some flexibility in the freshman year when schedule conflicts are common. Both adjuncts have experience and expertise in the CAD software used in IT 111.

The faculty are involved and actively engage industrial engineering students in a variety of ways. As noted in Criterion 2, Section D, of this report, upon declaring their major, industrial engineering students are assigned to a department **faculty advisor**. For incoming freshman and transfer students with less than 30 credit hours, they are also assigned to a university Success Coach. Industrial engineering students meet with their IE faculty advisor each semester to review their progress and plan course schedules for the next semester. Prior to their final semester, students meet with their faculty advisor to review their degree audit and complete required paperwork for graduation.

In addition to the advising role, faculty are involved in and support student activities and organizations within the department. Examples include, but not limited to:

- faculty sponsors for IIE student chapter, ASQ student branch, and Alpha Pi Mu honor society.
- coordinate and mentor students working in the department's Engineering & Statistics tutoring lab.
- sponsor / facilitate industry led student projects.
- enlist and work with students in a volunteer capacity during engineering summer camps, university orientations, and robotic competitions.
- coordinate and host career awareness events such as Engineering Day and industry tours.

Industry is a primary stakeholder in the industrial engineering program. In addition to employing graduates, interactions with industry provide one means for faculty to better understand professional practice and maintain currency in their respective professional areas. The industrial engineering faculty interact with professional practitioners, including local employers in a variety of ways. Examples include, but are not limited to:

- **IE 471/IE 495 Senior Design Experience:** The senior design experience is project-based, with the project being defined in conjunction with an industry sponsor(s). Under the guidance of the faculty, student teams plan, propose, and execute an actual industrial application. The industry partner(s) interact with the faculty and students throughout the two semester course sequence.
- **Industry Advisory Board (IAB):** The Industry Advisory Board (IAB) is comprised of industry representatives and employers from the field of industrial engineering. The board meets twice a year and provides guidance for the program as well as industry trends.
- **Engineering Day:** The Department of Engineering & Technology hosts an Engineering Day in February during National Engineering Week. The intent of the program is to bring awareness to the field of engineering as well as a networking opportunity for students and faculty. The program includes guest speakers from regional high-tech companies and culminates with a luncheon for upper classmen and the industry representatives.
- **L3 Communications Student Project Program:** A partnership was established with L3 Communications to provide students with the opportunity to gain invaluable work experience. Interdisciplinary student teams work on real-world engineering projects sponsored by L3. Participation is voluntary. Department faculty serve as project mentors and interact with the industry partner on a regular basis throughout the semester.
- **Local / State Industry Boards:** IE faculty serve in a variety of capacities with area and state industry representatives. Examples include, but are not limited to: 1) North Central Texas InterLink Board of Directors, 2) Metroplex Technology Business Council member, 3) Presiding Officer of the Sulphur River Regional Mobility Authority, and 4) Paris Texas Economic Development Corporation.
- **Professional Societies:** Program faculty and students from the IIE and ASQ student chapters attended professional chapter meetings and activities with Dallas-Fort Worth industry representatives.

D. Professional Development

Professional development activities serve to enhance an individual's knowledge, skills, and abilities. Faculty are expected to participate in professional development activities in their field. The university provides adequate, but not unlimited, resources to support professional development. Examples of recent professional development activities include, but are not limited to:

- American Society for Engineering Education (ASEE) Gulf-Southwest Annual Conference
- American Society for Engineering Education (ASEE) Annual Conference & Exposition
- ABET Commission Summit
- Institute of Industrial Engineers (IIE) Conference
- Annual International Occupational Ergonomics and Safety Conference
- Association of Technology, Management, and Applied Engineering (ATMAE) Annual Conference
- Texas Engineering Experiment Station NSF Grant Writing Workshop
- Metroplex Technology Business Council technology seminars/workshops
- American Society for Quality Dallas Chapter meetings
- International Academy of Business & Public Administration Disciplines (IABPAD)

In addition to the discipline specific professional development, the university requires employees to complete training on certain topics to comply with Federal, State, Texas A&M System, and A&M-University laws, policies, regulations, rules, and procedures.

E. Authority and Responsibility of Faculty

Program guidance is provided primarily by the IE faculty. As specified by ABET, they have responsibility and sufficient authority to define, revise, and implement curriculum and program objectives within the guidelines of the university and accrediting agencies.

1. Program Educational Objectives

Program Educational Objectives are defined and revised by the faculty, with input from key stakeholders. The PEO assessment and evaluation process, defined under Criterion 4, Section A, was defined and fully implemented by the faculty. Surveys and other assessments are conducted and evaluated by the faculty. The Office of Institutional Research has supported the development of and data collection from online surveys. Proposed revisions are brought forth by the faculty along with reasons and justification for the changes. The revisions are reviewed and approved by the Industry Advisory Board. The faculty is responsible for documenting and making PEOs accessible to stakeholders.

2. Student Outcomes

The Student Outcome assessment and evaluation process, defined under Criterion 4, Section A, was defined and fully implemented by the faculty. Assessments are conducted and evaluated by the faculty. Corrective actions are proposed and initiated by the faculty. The revisions are reviewed by the Industry Advisory Board. The faculty is responsible for documenting and making Student Outcomes accessible to stakeholders

3. Curriculum Revisions

In accordance to Texas A&M University-Commerce Rules and Procedure *03.02.99.R0.01 Program Development and Curriculum Approval Process*, curriculum revisions are initiated by the faculty within the academic department. The curriculum revision cycle starts in the Fall, one year prior to implementation. As an example, curriculum revisions in the Fall 2010 cycle will be implemented in Fall 2011. Any proposed curriculum revisions must be reviewed and approved at various levels to ensure compliance with the Texas Higher Education Coordinating Board (THECB) and Southern Association of Colleges and Schools (SACS) policies and guidelines. A general flow chart for the curriculum revision process is shown in Figure 6-1.

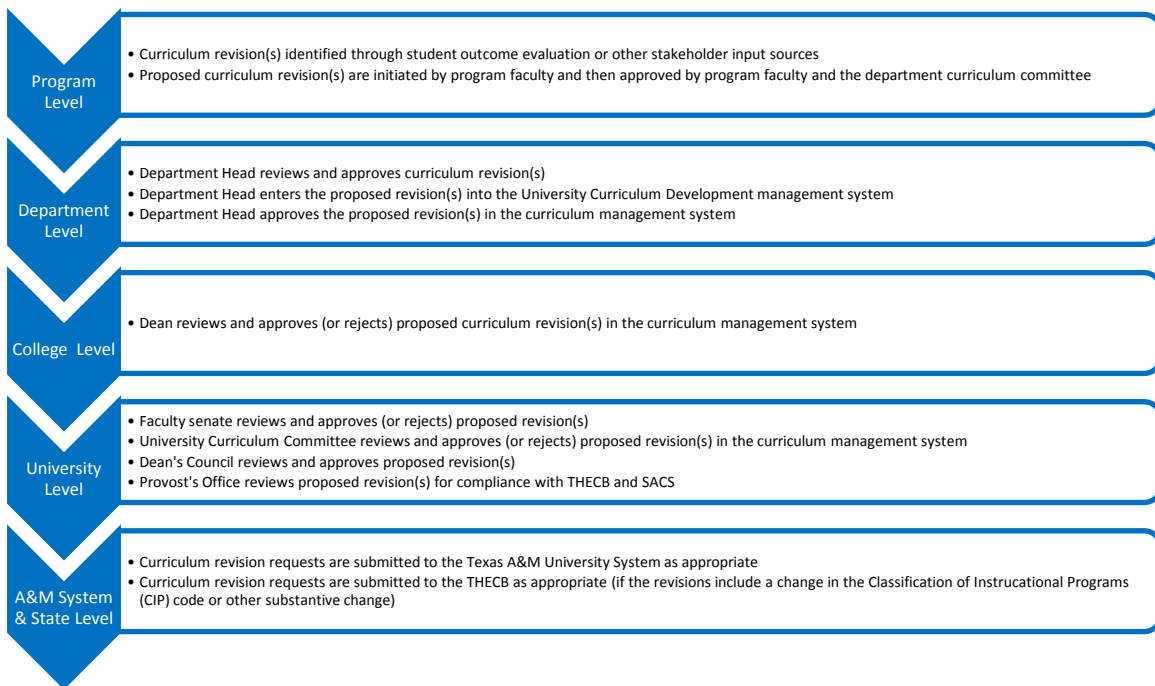


Figure 6-1: General Flowchart for A&M-Commerce Curriculum Revision Process

When the curriculum revision(s) are approved, it is the responsibility of the faculty to update electronic and paper documentation used for recruitment and advising. The Registrar's Office updates the undergraduate catalog.

Table 6-1. Faculty Qualifications
Bachelor of Science in Industrial Engineering

Faculty Name	Highest Degree Earned- Field and Year	Rank ¹	Type of Academic Appointment ² T, TT, NTT	FT or PT ⁴	Years of Experience			Professional Registration/ Certification	Level of Activity H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Pelin Altintas-Deleon <i>(*Dr. Deleon served in a FT ad-interim position 2/2011 – 5/2011. She will receive a FT tenure track appointment 9/1/2011)</i>	Ph.D., Systems and Engineering Management / Industrial Engineering, 2010	AST	NTT*	FT	2.5	.25	.25		M	L	L
Brent Donham	Ed.D., Educational Administration, 2005	ASC	TT	FT	13	14	2.5		H	M	L
Matthew Elam	Ph.D., Industrial Engineering & Management, 2001	ASC	TT	FT	0	17	4	ASQ CQE	H	H	L
E. Delbert Horton	Ph.D., Electrical Engineering, 1973	AST	TT	FT	36	10	9	PE	M	M	H
Sukwon Kim <i>(*Dr. Kim resigned 2/2011)</i>	Ph.D., Industrial and Systems Engineering, 2006	AST	TT	FT	0	5	4		M	L	L
Perry Moler	M.S., Technology Management	A	NTT	PT	3.5	1	1		M	H	L
Larry Walker	M.S., Industrial Technology	A	NTT	PT	33	5	5	PE, PMP	M	M	H

Instructions: Complete table for each member of the faculty in the program. Add additional rows or use additional sheets if necessary. Updated information is to be provided at the time of the visit.

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor I = Instructor A = Adjunct O = Other

2. Code: TT = Tenure Track T = Tenured NTT = Non Tenure Track

3. The level of activity, high, medium or low, should reflect an average over the year prior to the visit plus the two previous years.

4. At the institution

Table 6-2. Faculty Workload Summary

Bachelor of Science in Industrial Engineering

Faculty Member (name)	PT or FT ¹	Classes Taught (Course No./Credit Hrs.) Term and Year ²	Program Activity Distribution ³ (Based upon university appointment)			% of Time Devoted to the Program ⁵
			Teaching	Research or Scholarship	Other ⁴	
Pelin Altintas-Deleon <i>(*Took over Dr. Kim's courses after he resigned 2/2011)</i>	FT	IE 207* (3sh) – Spring 2011 IE 305* (3sh) – Spring 2011 IE 316* (3sh) – Spring 2011	40	40	20	100
Brent Donham	FT	IE 431 (3sh) – Fall 2010 IT / CONS 471 [†] (3sh) – Fall 2010	20	20	60	50
Matthew Elam	FT	IE 101 (3sh) – Fall 2010 IE 201 (3sh) – Fall 2010 IE 311 (3sh) – Fall 2010 IE 211 (3sh) – Spring 2011 IE 314 (3sh) – Spring 2011 IE 410 (3sh) – Spring 2011	40	40	20	100
E. Delbert Horton	FT	IE 312 (3sh) – Fall 2010 IE 411 (3sh) – Fall 2010 IE 471 (3sh) – Fall 2010 TMGT 510 [†] (3sh) – Fall 2010 IE 313 (3sh) – Spring 2011 IE 444 (3sh) – Spring 2011 IE 486 (3sh) – Spring 2011 IE 495 (4sh) – Spring 2011	40	40	20	100

Faculty Member (name)	PT or FT ¹	Classes Taught (Course No./Credit Hrs.) Term and Year ²	Program Activity Distribution ³ (Based upon university appointment)			% of Time Devoted to the Program ⁵
			Teaching	Research or Scholarship	Other ⁴	
Sukwon Kim (*Dr. Kim resigned 2/2011)	FT	IE 403 (3sh) – Fall 2010 IE 407 (3sh) – Fall 2010 IT 340 (3sh) – Fall 2010 TMGT 510 [†] (3sh) – Fall 2010 IE 207* (3sh) – Spring 2011 IE 305* (3sh) – Spring 2011 IE 316* (3sh) – Spring 2011	40	40	20	100
Perry Moler	PT	IT 111 (3sh) – Fall 2010 (2 courses) IT 111 (3sh) – Spring 2011 IT 112 (3sh) – Spring 2011	N/A	N/A	N/A	
Larry Walker	PT	IT 111 (3sh) – Fall 2010 TMGT 454 [†] (3sh) – Fall 2010 CONS 331 [†] (3sh) – Spring 2011 CONS 411 [†] (3sh) – Spring 2011	N/A	N/A	N/A	

[†]Not part of the industrial engineering degree.

1. FT = Full Time Faculty or PT = Part Time Faculty, at the institution
2. For the academic year for which the self-study is being prepared.
3. Program activity distribution should be in percent of effort in the program and should total 100%.
4. Indicate sabbatical leave, etc., under "Other."
5. Out of the total time employed at the institution.

CRITERION 7. FACILITIES

A. Offices, Classrooms and Laboratories

A&M-Commerce is located about one hour northeast of the Dallas metroplex. The campus features new facilities including a Music building, Student Center, Science building, recreation center, dorms, and Student Access and Success Center (One Stop Shop). The industrial engineering program is housed in the Charles J. Austin Engineering & Technology/Agricultural Sciences building. A campus map is shown in Figure 7-1 with an indicator showing the location of the Engineering & Technology building.



Figure 7-1: Texas A&M University-Commerce Campus Map

1. Offices

Every faculty and staff member in the Department of Engineering & Technology, including the industrial engineering faculty, has individual offices. All of the offices are in the same wing of one building, which enables regular faculty interaction. The offices vary in size but all are equivalent to faculty offices in other departments across campus. The typical faculty office has a desk, secondary work space (e.g. computer credenza), 1-2 bookcases, file cabinet, and two guest chairs. The space is adequate for student conferences. Each faculty is provided a computer and printer to support instruction, advising, and research. Standard software, such as Microsoft Office is on each machine. Discipline specific software is provided upon request. Each office has an individual phone line.

The department head and secretary are housed in a department office suite. The furnishings are equivalent to the faculty offices. Faculty offices are on the second floor, while the department office is on the first floor. The location of the department office is close to the Dean's office and easily located by current or potential students. A copier, fax machine, and other office equipment is located in the department office as well as an upstairs location near the faculty offices.

The department also has a small conference room that will accommodate meetings of 8-10 people. For larger meetings, conference rooms in the student center or in other buildings can be reserved.

2. Classrooms

A majority or all of the department courses are taught in the department's one traditional lecture classroom (32 capacity) or two computer laboratories (28 and 23 capacity). Courses such as IE 101 that have enrollments larger than 32, are moved to a larger lecture halls in the building or an adjacent building. Courses that utilize software are intentionally scheduled in the computer labs to enhance the learning environment for students. More than three-quarters of the classrooms on campus are multimedia equipped.

In addition to the formal instructional spaces, the department has space allocated to student services and support. There is a student lounge where student gather to study and interact. In addition to the open study space, the room has 6 computers and a printer. The Engineering & Statistics Tutoring lab is located next to the student lounge. The tutoring lab has multiple tables, computer, and white board to support the peer-tutoring.

3. Laboratory facilities

The Department of Engineering & Technology has nine laboratories, which support the instructional needs of both engineering programs (Industrial & Construction). The laboratories and equipment are summarized in Table 7-1.

Table 7-1: Department of Engineering & Technology Laboratories

Laboratory	Program	Equipment / Software
Automation & Manufacturing	IE	<ul style="list-style-type: none"> - FDM 3000 rapid prototyping machine - Uprint rapid prototyping machine - 8 TII Educational PLC trainers - TII Educational Module automated assembly - Bridgeport Mill EZ TRAK - Bridgeport EZPATH Lathe - Bridgeport HTC-8 Turning Center - 8 Craftsman Drill Presses - 12 Robotic kits
Ergonomics & Human Factors	IE	<ul style="list-style-type: none"> - Flock of birds motion detector system - Force plate system - Ergonomic hand tools - Meters and other test equipment
Systems Engineering Lab (SEL)	IE	<ul style="list-style-type: none"> - 4 Computers - LaserJet printers - Scanner - Adobe Acrobat Professional - Adobe Dreamweaver - Arena (Process simulation) - AutoCAD (CAD) - Camtasia (Screen recorder software) - ExtendSim Suite (Process simulation) - Minitab (Statistical and process management) - Risk Solver Premium (Linear programming) - SAS Analytics (Predictive & descriptive modeling) - Microsoft Office
Computer (118A)	IE/CONE	<ul style="list-style-type: none"> - 24 computers - Laser printer - Robotel classroom management system - SolidWorks (CAD – 3D Modeling) - AutoCAD (CAD) - MultiSIM (Schematic capture / circuit simulator) - Arena (Process simulation) - Microsoft Office
Computer (211)	IE/CONE	<ul style="list-style-type: none"> - 29 computers - Plotter - Robotel classroom management system - AutoCAD (CAD) - Minitab (Statistical and process management) - MultiSIM (Schematic capture / circuit simulator) - Arena (Process simulation) - Microsoft Office
Construction Manufacturing & Processes	CONE	Band saws, table saw, drill presses, miter saws, hand tools, ventilation trainer, computers, LaserJet printers
Hydrology	CONE	Water flume, modular flow channel, computers, printers
Soils	CONE	Triaxial shear, mechanical shaker, sand cone density test system, test equipment, computers, printers
Strength of Materials	CONE	Compression tester, tensile tester, hardness tester, beam testers, computers, LaserJet printers

All laboratories listed in Table 7-1, with the exception of the SEL, are available as open labs during daytime hours in which classes are not scheduled. The SEL is restricted to faculty and students involved in undergraduate research and industry sponsored projects. With the exception of the computer rooms, utilization of the other laboratories must be scheduled with the faculty or safety officer/technology assistant to ensure appropriate safety procedures are followed.

B. Computing Resources

The university provides a variety of computers, computer laboratories, and computer classrooms, which support the administrative and academic functions of the university. These include assigned course work, research related degree programs, faculty research and service activities, faculty and staff training and other applications approved by the university.

1. Distance Learning

There are eleven interactive video classrooms on the Commerce campus and four at off-site locations. The **IE program does not utilize any of the off-site locations**. In 2009, the University's web-based course enrollment exceeded 17,500 in 731 courses. The current learning management system used for online course delivery is eCollege, a Pearson product. The **IE courses are not offered in an online format**, with the exception of one technology course. Students may opt to take online courses in their University Studies, when available. Features of eCollege are used to enhance some of the program courses, including the electronic dropbox, doc sharing, and the communication module.

The Office of Instructional Technology and Distance Education (ITDE) offer a variety of services to faculty and students. These services include an instructional design unit, training and support for distance technologies, and multimedia services.

2. Classrooms & Computer Labs

Of the 116 available classrooms on the Commerce campus, 89 rooms are multimedia equipped. There are open access computer labs located across the campus.

- *McDowell Business Administration Building Room 345* is open to students. There is some class use and thus it may not be available at all times. Hours are Monday – Thursday from 8:00 AM – 6:00 PM. It has 27 PCs and 1 printer.
- *Science Building Room 210* is open to students. There is some class use and thus it may not be available at all times. It has 40 PCs and 1 printer. Hours are Monday – Friday 10:00 AM – 6:00 PM.
- *Education South Room 122* is open to students. There is some class use and thus it may not be available at all times. Hours are Monday – Thursday 8:00 AM – 8:00 PM. It has 60 PCs and 1 printer.
- *Journalism Building Rooms 101 and 102* are open to students. There is some class use and thus it may not be available at all times. Room 101 has 22 PCs and 1 printer.

Room 102 has 28 PCs and shares the printer in Room 101. Hours are Sunday - Saturday 10:00 AM – 10:00 PM.

Additional computer labs are located at the Mesquite Metroplex Center and the Universities Center in Downtown Dallas locations and several academic departments manage labs for research, for students, or for mixed purposes.

3. Library

The James G. Gee library extensive book and journal collections in print and electronic delivery cover a wide variety of disciplines. They also offer access to federal and state Government Documents, as well as federal and state law resources in print and electronic delivery. A growing number of our resources can be accessed from the office, home, or residence hall via the Internet.

Gee Library provides an Information Commons consisting with 78 computers, internet access, and specialized programs. During long semesters, the library is open:

7:30 AM – midnight	Monday – Thursday
7:30 AM – 8:00 PM	Friday
10:00 AM – 4:00 PM	Saturday
2:00 – midnight	Sunday

4. Student Support Services

Writing Center. The Writing Center offers students free, one-on-one writing assistance for all majors, and disciplines. Tutoring services include one-on-one, in groups (3-5 writers), or online. During long semesters, the Writing Center is available:

9:00 AM – 4:00 PM	Monday – Thursday
9:00 AM – 1:00 PM	Friday
6:00 PM – 9:00 PM	Sunday

Math Lab. The Math Lab offers free tutoring to students and is aimed at helping students at the remedial, freshman, and sophomore levels. Higher level mathematics tutoring is available for IE students in the Engineering & Statistics Tutoring lab. During long semesters, the Math Lab is available:

8:00 AM – 8:00 PM	Monday and Wednesday
8:00 AM – 6:00 PM	Tuesday and Thursday
8:00 PM – 3:00 PM	Friday

5. Student Life

Internet access is available in every occupied building through a traditional wired network as well as an expanding wireless network that covers most of the academic buildings and student center.

myLeo portal provides access to online services such as admissions, registration, financial aid, student accounts, LeoMail, and eCollege. myLeo can be accessed both from on- and off-campus locations.

C. Guidance

Guidance in the use of tools, equipment, and computing resources for a given course is provided and/or demonstrated by the course instructor and/or the department safety officer/technology assistant. This guidance is typically integrated directly into the course instruction.

When appropriate, students working in the laboratories are given hands-on safety demonstrations, handouts, and quizzes. This training is typically provided by department safety officer/technology assistant.

D. Maintenance and Upgrading of Facilities

The primary sources of funding for maintaining and upgrading tools, equipment, and computing resources have been 1) course fees, 2) special item funding, and 3) the Higher Education Assistance Fund (HEAF). Of these three sources, the majority comes from HEAF.

Course Fees. Revenue generated from course fees typically fund software, consumables, and other materials for the engineering courses and laboratories. These funds are allocated at the College level and departments submit proposals/requests to the dean to access them.

Special Item Funding. Higher Education Special Items appropriated from the Texas Legislature are items that are not supported through formula funding and support the special mission of the institution. Special items can also be used to support new academic programs. The Industrial Engineering program has received special item funding since its inception in 2002. These funds primarily cover salaries and travel related to faculty development. However, the funds have been used to maintain or enhance tools and equipment used in the program.

HEAF. The Higher Education Assistance Fund was established by the Texas Legislature. HEAF funds are allocated by the state to eligible institutions, including A&M-Commerce. These funds can be used for the purpose of acquiring land, constructing and equipping buildings, major repair and renovation of buildings or other permanent improvements, and acquisition of capital equipment and library materials. The funds are allocated by formula to the university and then distributed within the institution, including a portion to each college. Funds are allotted to the departments based upon the requests made during the HEAF budget request cycle in the Spring, prior to the new academic year.

Equipment, computing resources, and related program enhancements funded under these three sources in the recent past are summarized in Table 7-2.

Table 7-2: Recent Industrial Engineering Resource Acquisitions

Equipment / Computing / Resources	Cost	Funding Source
Engineering & Statistics Tutoring Lab <i>Free tutoring service for engineering courses. Qualified upper classman serve as tutors under the direction of IE faculty.</i>	\$60,000 (3 year funding)	Special Item
Industrial Engineering Scholarship Fund <i>Free tutoring service for engineering courses. Qualified upper classman serve as tutors under the direction of IE faculty</i>	\$50,000	Special Item
Programmable Logic Controller Trainers (5) <i>Supports the Programmable Automation, IE 431, laboratory. Supplemented existing equipment.</i>	\$32,475	HEAF
AutoCAD annual software license <i>Supports the Computer-Aided Design course, IT 111. Typically offer 4 sections per year and average close to 100 students.</i>	\$6,600	Course Fee
Systems Engineering Lab (SEL) <i>Purchased hardware and software to establish the laboratory, which is used for undergraduate research and industry sponsored projects.</i>	\$20,000	Special Item
Laptop Computers (2) <i>Department computers to support instruction, scholarly activities, recruitment, and student activities.</i>	\$5,000	HEAF
Copier <i>Department Office copier.</i>	\$5,000	HEAF
Faculty Computer <i>Replacement computer.</i>	\$600	HEAF

E. Library Services

Texas A&M University-Commerce Libraries collection has over a million items. This figure includes over 400,000 monographs, 300,000 serials volumes, 423,000 government documents, and over 500,000 microforms. Access to electronic resources includes over 200 databases, 25,000 journals, and approximately 55,000 books.

A full report that analyzes the collection related to the specific subject areas of the required classes for the Bachelor of Science in Industrial Engineering will be available for review during the site visit. The analysis will report on the engineering collection resources, including books, electronic databases and resources, and archival journals. A summary of the type of information that will be available in the full report is shown in Table 7-3.

Table 7-3: Sample of the Library’s Technical Collection Related to Industrial Engineering

Subject	TAMU-C Books All years	Number of Core Titles	Percentage of core titles held	Journal Titles held	Cited/Peer Reviewed
Engineering Management T55.4-T60.8, TA190-194	952	14/33	45.16 %	66	19/40
General Management including Business & Economics HD1-HD100	9583	171/476	35.92%	312	51/171
Statistics (QA273-280)	1745	53/100	53%	60	32/43
Systems Engineering TA168-TA169.7	91	0/2	0.00%	8	5/7
Engineering Research and Design T174-T178	147	0/1	0.00%	26	4/9
Technical Drawing, Engineering Graphics T351-T385	613	0/4	0.00%	12	9/10
Mathematics through Calculus	4788	65/120	57.24%	143	78/118
Chemistry and Chemical Engineering (QD, TP)	7255	180/857	21.00%	547	343/420
Physics (QC)	6617	205/605	33.88%	341	209/272

The first four columns look at monographs. The column titled “Number of Core Titles” reflects *Bowker’s Book Analysis* of the most highly recommend titles for undergraduate curriculum. The first number in the column indicates what we own; the second one indicates the number of core titles recommended. The “Percentage of Core Titles Held” shows what is currently owned by Texas A&M University-Commerce Libraries. The last two columns look at current journal coverage. The majority of the journals are electronic. Some are in databases; others are in publisher’s electronic journal collections. The “Cited/Peer Reviewed” column reveals the quality of the journals. The first figure indicates journals which are covered in *Journal Citation Reports* which includes all the journals in *Science Citation Index* and *Social Sciences Citation Index* in our database *Web of Science*. Since only journals that are frequently cited are included in these databases, these figures indicate that the journal is heavily used in the field. The last figure indicates if the journals are peer reviewed.

The A&M-Commerce Libraries offer numerous services to faculty. Some of the services include:

- **Class Reserves.** Faculty may use class reserves to make scarce materials available for their class and to ensure that all students have access to the required material.
- **Document Delivery.** Library can deliver documents to faculty members on the Commerce campus.
- **Electronic Databases.** Library provides electronic access to journal articles, book reviews, e-books, dissertations, and a number of other resources by using their electronic databases.
- **EndNotes Web.** Software is available to import citations from many electronic library databases and the Internet. Citations can be formatted to virtually any citation style.

- **Interlibrary Loan.** Library can assist in finding almost any type of item including books, dissertations, or thesis; journal articles, and microform.
- **Library Instruction.** Library has two electronic classrooms, which librarians use for computer demonstrations and hands-on training.
- **Research Assistance.** The professional librarians offer several services specifically designed to assist and support faculty needs related to classroom instruction, as well as those related to professional research.
- **Study Carrels.** Library offers quiet, secure spaces at the library for faculty research.
- **TurnItIn.com.** Library offers this powerful tool in the fight against plagiarism. Through a quick and easy set-up, faculty and their students are able to check papers against academic databases, the Internet, and the cache of papers held by TurnItIn.

The technical collection and services provided by the A&M-Commerce Libraries adequately meet the needs of the program faculty and students.

F. Overall Comments on Facilities

Student safety is the number one priority in our laboratories. To assist students, staff and faculty in safety concerns, the Department of Engineering & Technology has developed an interactive always on safety plan available to all members of the department, college and, university. Elements of this plan are accessible from the Engineering & Technology home page under the tab Safety Resources. In addition to the online safety plan, students working in the laboratories are given hands-on safety demonstrations, handouts, and quizzes as needed. This is a comprehensive safety plan that has been developed and maintained in conjunction with the Texas A&M University – Commerce Office of Risk Management, University Safety Committee, and the Department of Training and Development. There is also an operating and preventative maintenance program for laboratory equipment.

The industrial engineering facilities are adequate and safe and provide an environment that is conducive to student learning.

CRITERION 8. INSTITUTIONAL SUPPORT

A. Leadership

The organizational structure for the Industrial Engineering program is shown in the Figures 2-4 in the Background Information chapter, Section D at the beginning of this report. Industrial Engineering is one of three undergraduate programs in the Department of Engineering & Technology. The direct reporting structure flows from the University President to the Provost, to the Dean of the College of Science, Engineering, and Agriculture, to the Department Head. The current leadership is supportive and committed to the ongoing success of the industrial engineering program as well as the Department of Engineering & Technology as evidenced by the following:

1. Departmental Shift Towards Engineering

The department has not left its roots in technology but a shift towards engineering is evident when the undergraduate programs in the department are compared when the industrial engineering program was implemented to its current makeup. Figure 8-1 shows a graphical comparison of the programs in 2002 and 2011.

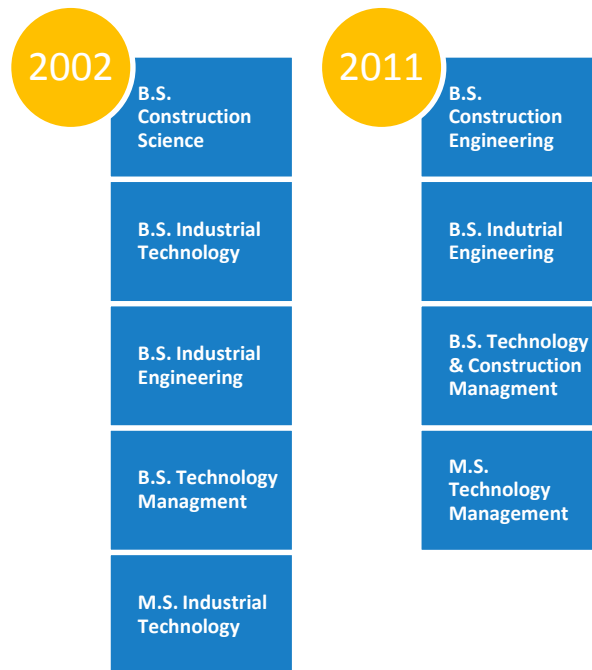


Figure 8-1: Department of Engineering & Technology Undergraduate Program Comparison

2. College of Science, Engineering, & Agriculture

The formation of two new colleges was approved for Texas A&M University-Commerce by the Texas A&M University-System Board of Regents and the Texas Higher Education Coordinating Board. One of the new colleges is the College of Science, Engineering, and

Agriculture. The Department of Engineering & Technology became a part of the College of Science, Engineering, and Agriculture, effective June 1, 2011. Prior to the formation of the new college, the Department of Engineering & Technology was under the College of Business & Technology. This reorganization aligns the science, technology, engineering, and mathematics (STEM), which will significantly improve communications and meaningful interactions between the departments. The formation of the new college shows the continued commitment of the university to engineering and the other STEM disciplines. The reorganization did not involve a reduction in faculty lines or budget for the department.

An interim dean was appointed to the College of Science, Engineering, and Agriculture while the university conducts a national search for a permanent administrator. Dr. Jerry Parish is the interim dean for the college. Dr. Parish is a tenured professor in the Department of Engineering & Technology. He joined the university in 1994 as the department head of industrial technology. He received an appointment as associate dean for the College of Business & Technology, where he has served since 2003.

B. Program Budget and Financial Support

Higher education is experiencing a financial crisis of unprecedented proportions. Although not as severe as other states, Texas is no different with public universities facing significant budget cuts. Despite these looming cuts, the department has not lost any engineering faculty lines.

1. Budget Process

Due to the move into the new College of Science, Engineering, & Agriculture, the budget development process differed slightly from prior years. The general budget development process used for the 2011-2012 academic year will be described as it will more accurately reflect the process moving forward in the new college.

It should be noted that at the time this report was created, the Texas Legislature had not finalized the budget for the next biennium. Figures in this report are believed to be accurate but are subject to change based upon the final approved budget.

A typical budget development process is initiated by establishing a baseline budget by rolling forward the recurring funds. Departments submit requests and justification for proposed budget adjustments, which includes new faculty lines, graduate assistants, increased adjuncts, increased operational funds, and other related items to the college dean. The baseline budgets and budget proposals are taken to the Budget Review and Development Council (BRDC). The BRDC builds upon the strategic planning process by linking consensus-based goals to the university budget. Members of the Council represent academic, business, and student service units across the university. The Council engage in a variety of activities that consider; 1) overall objectives of the process, 2) expectations of stakeholders, 3) external fiscal environment, 4) internal budget processes, 5) funding sources, 6) mandated expenditures, 7) salary plan, 8) budget assumptions, 9) possible fee increases, 10) possible new fees, and 11) possible tuition

increases. The Council’s work culminates with the submission of a recommended budget to the president, which will provide the basis for subsequent development of detailed budgets at the unit level.

The anticipated budget for the industrial engineering program, including departmental support is shown in Table 8-1. The 2010-2011 budget is shown as a reference.

Table 8-1: Industrial Engineering Operational Budget

Line Item	2010-2011	2011-2012
Department*		
Staff salaries	\$118,825	\$118,825
Student worker wages & benefits	\$5,823	\$5,823
Operating costs	\$19,033	\$19,033
Lab supplies	\$1,552	\$1,552
Industrial Engineering program		
Faculty salaries (including department head)	\$330,631	\$337,065
Operating costs		\$27,630
	\$475,864	\$509,928

*Department budget supports all programs in the department

Of the required \$509,928 budget, approximately \$180,000 will be funded through special item money from the state. In the future, additional revenue sources will have to be established to cover these temporary funds. It is anticipated that a portion of this will be covered with the continued increase in enrollment in the industrial engineering and the new construction engineering program.

The Higher Education Assistance Fund (HEAF) funds are allocated by the state to eligible institutions, including A&M-Commerce. These funds can be used for the purpose of acquiring land, constructing and equipping buildings, major repair and renovation of buildings or other permanent improvements, and acquisition of capital equipment and library materials. The funds are allocated by formula to the university and then distributed within the institution, including a portion to each college. Funds are allotted to the departments based upon the requests made during the HEAF budget request cycle in the Spring, prior to the new academic year. A total of \$104,000 in HEAF funding was requested for the department. Approximately \$25,000 was industrial engineering related. It is anticipated these requests will be funded but at the time of this report was written, the HEAF allocations had not been finalized at the state level.

2. Instructional Support

The university award three types of graduate assistantships, including a graduate teaching assistant (GAT). Teaching assistants must teach courses in the department in which they are assigned. Teaching assistants are teachers of record. To qualify for a teaching assistantship, the student must have earned a minimum of 18 graduate hours in the

discipline they are teaching. Due to the fact the engineering program currently does not have a graduate program, there are no qualified students to teach in the industrial engineering program. At this time the program or department does not employ any teaching assistants.

The institution provides limited teaching workshops. Primarily, the workshops that are offered are focused on distance learning, which has limited benefit to the program faculty since minimal IE program courses are taught online. Faculty seeking workshops on best practices in teaching do so through external events, such as an American Society for Engineering Educators conferences.

3. Other Funding Sources

As described in Criterion 7, Section D, the primary sources of funding for maintaining and upgrading tools, equipment, and computing resources have been 1) course fees, 2) special item funding, and 3) the Higher Education Assistance Fund (HEAF). The department recognizes the need for developing other sources of revenue and funding to supplement existing sources.

a. Course Fees

The university establishes a course fee structure for each college. The course fees under the College of Science, Engineering, and Agriculture are significantly higher than the College of Business & Technology. The move to the new college will increase the funding available to the department from this source.

b. Grants

External grants are a source of funding universities are emphasizing and becoming more reliant upon. The department has had limited success in external funding to date, due in large part to the lack of a graduate program. Without graduate students, it is difficult to demonstrate an infrastructure that can support the large research grants, which allow the purchase of capital equipment and computing resources. While continuing to explore opportunities for the large agency grants, the department has adopted the strategy of seeking out smaller grants as a means of building the necessary infrastructure. These sources include local and state funding agencies. Examples of recent grants that have enhanced or added resources to the program include:

S-STEM Scholarship Grant, National Science Foundation. Scholarships for Biological & Environmental Sciences, Chemistry, Industrial Engineering & Technology, or Physics.

Engineering Recruitment Program – Engineering Summer Programs, THECB Award Number: 05638, Texas Higher Education Coordinating Board, \$20,000. Engineering Summer camp. (2011)

Engineering Recruitment Program – Engineering Summer Programs, 003565-ER10-0000, Texas Higher Education Coordinating Board, \$18,000. Engineering Summer camp. (2010)

Engineering Recruitment Program – Engineering Summer Programs, 003565-ERP09-0000, Texas Higher Education Coordinating Board, \$11,111. Engineering Summer camp. (2009)

TEXO Education and Research Foundation 2010 Construction Department Grant, TEXO: The Construction Association, \$2,000. Computer equipment and professional development for the A&M-Commerce Student Construction Association (SCA).

*Injury Prevention in Rural Dwelling Elders: A Focus on Slips, Trips, and Falls, A&M-Commerce Interdisciplinary Research Grant, \$29,969. (2010-2011)
Grant was not fully executed due to both principle investigators accepting positions at other institutions*

c. Non-Grant Funding

Strategy 1.4 under the university's guiding principle Stewardship, is to increase non-grant funding from external sources. The department is actively seeking these sources through partnerships with local industry and community organizations. Recent examples of non-grant funding that have benefited the department include:

Endowed Department Scholarships. The Department of Engineering & Technology has nine endowed scholarships, which are used to recruit and retain engineering and technology students. Twenty-six scholarships were awarded for Fall 2011, of which eleven were awarded to industrial engineering students.

Lion's Pride BEST Robotics. The Department of Engineering & Technology are a hub for the non-profit Best robotics program. High school and middle school teams compete in a six week competition during the Fall semester. This is a key part of the department strategy to educate and provide career awareness to the STEM fields. Private, industry, and educational donations totaled \$24,000 for 2011. These funds will cover the expenses of 15-20 teams.

Industry Sponsored Projects. The Department of Engineering & Technology works closely with area businesses to provide experiential learning opportunities for the students. One student led project resulted in a significant enhancement and cost savings to the company. The company donated \$25,000 to the college on behalf of the department.

4. **Resource Adequacy**

The resources are adequate to support the program and the attainment of the student outcomes. For example:

- Maintained department budget in an environment of state budget cuts to higher education
- Formation of a new college without reduction of faculty lines or budget

- Higher course fees under the new STEM college
- Newly established engineering laboratories to support instruction
- Equipment upgrades in IE laboratories
- Newly established undergraduate research laboratory
- Funded Engineering & Statistics Tutoring lab
- Maintained instructional software

C. Staffing

The Department of Engineering & Technology staffs:

- Department head
- Department secretary
- Student worker(s)
- Engineering mentor / transfer liaison (recruitment & outreach)
- Safety officer / technical assistant

The above staff adequately supports the departmental programs. As programs grow, additional staff will be required to maintain the same level of service.

The university requires employees to complete training on certain topics to comply with Federal, State, Texas A&M System, and A&M-University laws, policies, regulations, rules, and procedures.

D. Faculty Hiring and Retention

Texas A&M University-Commerce has established a set of guiding principles or imperatives to achieve the university mission. The first guiding principle is Diversity.

*Foster a culture of inclusion which **attracts to our university highly qualified students, faculty, and staff** who represent the diversity of the region we serve, and who will engage with us in the pursuit of our university's vision and mission*

1. New Faculty Hiring Process

The hiring process provided by the Human Resources department at A&M-Commerce is shown in the flow chart in Figure 8-2. For faculty positions, a national search is conducted.

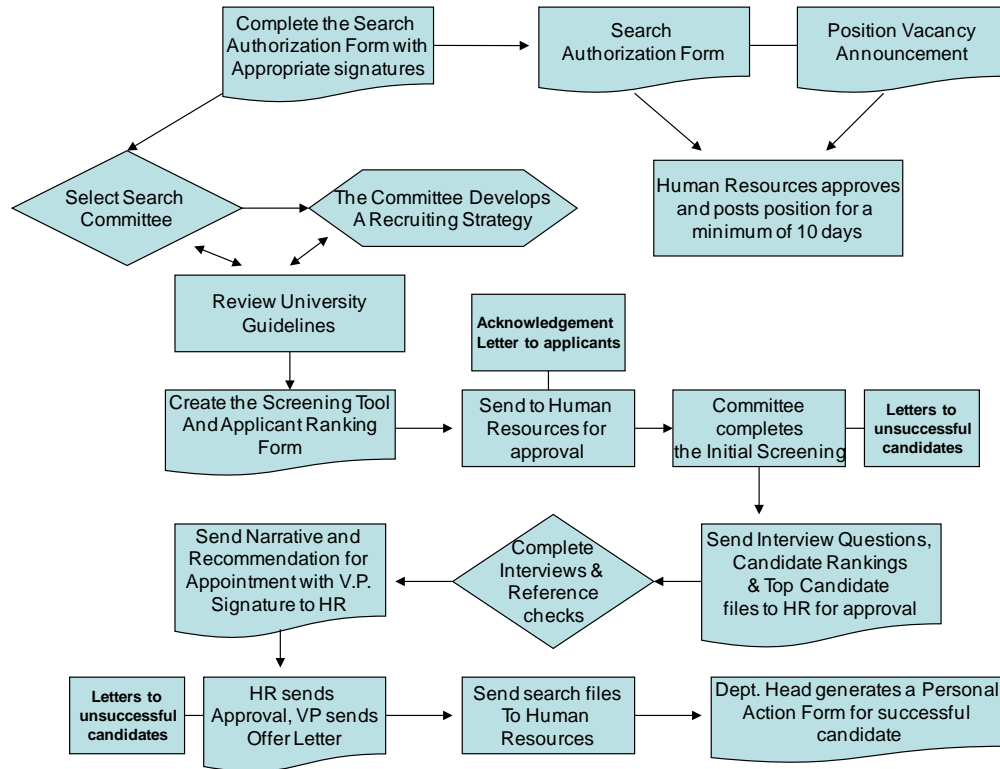


Figure 8-2: A&M-Commerce New Faculty Hiring Process

2. Strategies to Retain Qualified Faculty

The following strategies are employed to recruit and retain qualified faculty:

- Benefits available through the Texas A&M University-System
- Texas A&M University-System offers tenure and professional faculty tracks
- Texas A&M University-System has a monetary reward system for teaching excellence
- Competitive salaries with other IE programs in the nation
- Formation of the new STEM college (College of Science, Engineering & Agriculture) provides synergistic opportunities with other STEM departments
- New engineering facilities (construction engineering laboratories & Systems Engineering Lab)
- Upgraded IE automation and manufacturing lab
- Opportunity for professional growth beyond traditional teaching and scholarly activities due to the young age of the program
- Unique consulting opportunities
- Planning for graduate IE engineering program

E. Support of Faculty Professional Development

To date, adequate resources have been available to support requested faculty development. Examples of recent professional development activities include, but are not limited to:

- American Society for Engineering Education (ASEE) Gulf-Southwest Annual Conference
- American Society for Engineering Education (ASEE) Annual Conference & Exposition
- ABET Commission Summit
- ABET Accreditation Workshops
- Institute of Industrial Engineers (IIE) Conference
- Annual International Occupational Ergonomics and Safety Conference
- Association of Technology, Management, and Applied Engineering (ATMAE) Annual Conference
- Texas Engineering Experiment Station NSF Grant Writing Workshop
- Metroplex Technology Business Council technology seminars/workshops
- American Society for Quality Dallas Chapter meetings
- International Academy of Business & Public Administration Disciplines (IABPAD)

Faculty submit travel requests to the Department Head. Department Head reviews and approves activities from available funds.

PROGRAM CRITERIA

The Bachelor of Science in Industrial Engineering satisfies all applicable program criteria as evidenced in the following sections of this report.

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APPENDICES

Appendix A – Course Syllabi

On October 29, 2009, the Texas Higher Education Coordinating Board adopted Chapter 4, Subchapter N, Sections 4.225-4.229, concerning Public Access to Course Information, required by House Bill 2504, 81st Texas Legislature. Texas Education Code § 51.974 authorizes the Texas Higher Education Coordinating Board to adopt the following rule.

For each undergraduate classroom course offered for credit by the institution, a syllabus and a curriculum vita for the instructor of record must be made available to the public on the institution's internet web site.

Syllabi can be accessed from the Texas A&M University-Commerce home page by selecting Schedule of Classes. Each course listed includes links to the, syllabus, instructor CV, and textbooks. Institutional guidelines for course syllabi are defined in the Texas A&M University-Commerce Rules & Procedures *12.01.99.R0.05 Guidelines for Content and Distribution of Syllabi: Roles and Responsibilities of Faculty*.

A two-page syllabus for each course, which satisfies the mathematics, science, and discipline-specific requirements required by Criterion 5, is provided in this appendix. For the discipline-specific courses, a copy of the addendum is also provided. The addendum shows the alignment between the Industrial Engineering Course Competencies (IECCs) and the Student Outcomes (a)-(k).



IE 101 Introduction to Industrial Engineering
3 credits / 3 Lecture

Instructor: Matthew E. Elam, PhD.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Lial, Margaret L., Greenwell, Raymond N., and Ritchey, Nathan P. (2009). *Finite Mathematics and Calculus with Applications*, Eighth Edition. Pearson Education, Inc. [ISBN-13: 978-0-321-42651-2, ISBN-10: 0-321-42651-7].

Required Materials: Students will need a scientific calculator, preferably one with built-in statistical functions.

Course Description:

Basic industrial engineering concepts to include systems optimization, variability in systems, and production systems. Student teams engage in design projects that require the integration of several concepts. Ethics and professional conduct are stressed. The computer competency evaluation will be administered in this course.

Course Requirement: Required

Student Learning Outcomes:

After completing this course, students should be able to (the numbering does not necessarily imply any ordering):

1. Demonstrate knowledge of Industrial Engineering, related Texas A&M University-Commerce web sites, and engineering ethics
2. Demonstrate introductory knowledge of matrices
3. Demonstrate introductory knowledge of linear programming
4. Demonstrate introductory knowledge of engineering economy
5. Demonstrate introductory knowledge of discrete Mathematics
6. Demonstrate introductory knowledge of probability and statistics

Course Topics

The following is a tentative ordered list of the course content derived from the text. Some of these sections will only be partially covered. Students should carefully read and study these sections before they are covered in class.

1. Information on Industrial Engineering, related Texas A&M University-Commerce Web sites, and engineering ethics (none of this information is in the text but some of it is in the books on reserve in the library – everything students need to know will be provided to them by the instructor)
2. Chapter 1, Sections 1.1, 1.2
3. Chapter 2, Sections 2.1, 2.2, 2.3, 2.4, 2.5
4. Chapter 3, Sections 3.1, 3.2
5. Chapter 4, Sections 4.1, 4.2
6. Chapter 5, Section 5.1
7. Chapter 6, Sections 6.1, 6.2, 6.3
8. Chapter 7, Sections 7.1, 7.2, 7.3
9. Chapter 9, Sections 9.1, 9.2

ABET ADDENDUM for IE 101

IE Course Competencies (IECCs)

1. Demonstrate knowledge of Industrial Engineering, related Texas A&M University-Commerce Web sites, and engineering ethics
2. Demonstrate introductory knowledge of matrices
3. Demonstrate introductory knowledge of linear programming
4. Demonstrate introductory knowledge of engineering economy
5. Demonstrate introductory knowledge of discrete Mathematics
6. Demonstrate introductory knowledge of probability and statistics

Relationship of Student Outcomes (a)-(k) to IECCs

IECCs	IE Student Outcomes	
2, 3, 4, 5, 6		(a) An ability to apply knowledge of mathematics, science, and engineering
		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
2, 3, 4, 5, 6		(e) An ability to identify, formulate, and solve engineering problems
1		(f) An understanding of professional and ethical responsibility
1, 2, 3, 4, 5, 6		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
1		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 101 Introduction to Industrial Engineering
3 credits / 3 Lecture

Instructor: Matthew E. Elam, PhD.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Optional: Larsen, Ronald W. (2009). *Engineering with Excel*, Third Edition. Pearson Prentice Hall [ISBN 0-13-601775-4]. The instructor has a copy of this text students may borrow for short periods of time. Students may also use Excel's Help menu for additional guidance. Everything students need to know will be provided to them by the instructor.

Required Materials: Students will need a scientific calculator, preferably one with built-in statistical functions.

Course Description:

This course will utilize Microsoft Excel to solve problems that commonly arise in engineering analysis. Numerical methods of problem solving will be emphasized. Problem solving techniques will be accentuated rather than the underlying mathematical solution procedures. Application of these methods for use in other science, mathematics, engineering, and technology courses will be illustrated. A one-hour per week outside class laboratory will be required.

Course Requirement: Required

Student Learning Outcomes:

1. Demonstrate knowledge of Excel fundamentals
2. Demonstrate knowledge of equations in Excel
3. Demonstrate knowledge of graphing in Excel
4. Demonstrate knowledge of Excel's built-in functions
5. Demonstrate knowledge of importing, exporting, and sorting data in Excel
6. Demonstrate knowledge of Excel's Data Analysis menu option
7. Demonstrate introductory knowledge of Minitab, a statistical software package
8. Demonstrate knowledge of matrices in Excel
9. Demonstrate knowledge of Excel's Goal Seek and Solver

10. Demonstrate knowledge of Excel macros

Course Topics

The following is a tentative ordered list of the course content. After completing this course, students should be able to (the numbering does not necessarily imply any ordering):

1. Excel fundamentals
2. Equations in Excel
3. Graphing in Excel
4. Excel's built-in functions
5. Importing, exporting, and sorting data in Excel
6. Excel's Data Analysis
7. Introduction to Minitab
8. Matrices in Excel
9. Excel's Goal Seek and Solver
10. Excel macros

ABET ADDENDUM for IE 201

IE Course Competencies (IECCs)

1. Demonstrate knowledge of Excel fundamentals
2. Demonstrate knowledge of equations in Excel
3. Demonstrate knowledge of graphing in Excel
4. Demonstrate knowledge of Excel's built-in functions
5. Demonstrate knowledge of importing, exporting, and sorting data in Excel
6. Demonstrate knowledge of Excel's Data Analysis menu option
7. Demonstrate introductory knowledge of Minitab, a statistical software package
8. Demonstrate knowledge of matrices in Excel
9. Demonstrate knowledge of Excel's Goal Seek and Solver
10. Demonstrate knowledge of Excel macros

Relationship of Student Outcomes (a)-(k) to IECCs

IECCs	IE Student Outcomes	
1, 2, 3, 4, 5, 6, 7, 8, 9, 10		(a) An ability to apply knowledge of mathematics, science, and engineering
		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
1, 2, 3, 4, 5, 6, 7, 8, 9, 10		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
1, 2, 3, 4, 5, 6, 7, 8, 9, 10		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
1, 2, 3, 4, 5, 6, 7, 8, 9, 10		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 207 Engineering Economic Analysis
3 credits / 3 Lecture

Instructor: Sukwon Kim, PhD.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Sullivan, Wicks, and Koelling, Engineering Economy, 14th edition (2009), Pearson Prentice Hall, ISBN: 978-0-13-614297-3 or 0-13-614297-4.

Required Materials: You will need a scientific calculator, preferably one with built-in statistical functions.

Course Description:

Emphasizes the systematic evaluation of the costs and benefits associated with proposed technical projects. The student will be exposed to the concepts of the "time value of money" and the methods of discounted cash flow. Students are prepared to make decisions regarding money as capital within a technological or engineering environment.

Course Requirement: Required

Student Learning Outcomes:

After completing this course, students should be able to (the numbering does not necessarily imply any ordering):

1. Demonstrate knowledge of engineering economic analysis
2. Demonstrate knowledge of the time value of money
3. Demonstrate knowledge of borrowing, lending, and investing
4. Demonstrate knowledge of establishing the planning horizon and the minimum attractive rate of return
5. Demonstrate knowledge of measuring the worth of investments for the purpose of comparing investment alternatives

Course Topics

The following is a tentative ordered list of the course content derived from the text. Some of these sections will only be partially covered. You should carefully read and study these sections before they are covered in class.

1. Chapter 1, Sections 1.1-1.5 (1 lectures)
2. Chapter 2, Sections 2.1-2.6 (2-3 lectures)
3. Chapter 3, Sections 3.1-3.7 (2-3 lectures)
4. Chapter 4, Sections 4.1-4.18 (12-13 lectures)
5. Chapter 5, Sections 5.1-5.10 (2-3 lectures)
6. Chapter 6, Sections 6.1-6.9 (2-3 lectures)
7. Chapter 10, Sections 10.1-12 (1 lectures)
8. Chapter 11, Sections 11.1-6 (1 lectures)

ABET ADDENDUM for IE 207

IE Course Competencies (IECCs)

1. Demonstrate knowledge of engineering economic analysis
2. Demonstrate knowledge of the time value of money
3. Demonstrate knowledge of borrowing, lending, and investing
4. Demonstrate knowledge of establishing the planning horizon and the minimum attractive rate of return
5. Demonstrate knowledge of measuring the worth of investments for the purpose of comparing investment alternatives

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
1-5		(a) An ability to apply knowledge of mathematics, science, and engineering
		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
1-5		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
1-5		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
		(g) An ability to communicate effectively
1-5		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
1-5		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 211 Engineering Probability and Statistics
3 credits / 3 Lecture

Instructor: Matthew E. Elam, PhD.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Montgomery, Douglas C. and Runger, George C. (2011). Applied Statistics and Probability for Engineers, Fifth Edition. John Wiley and Sons, Inc. [978-0-470-05304-1].

Required Materials: Students will need a scientific calculator, preferably one with built-in statistical functions.

Course Description:

This course covers the role of statistics in engineering, probability, discrete random variables and probability distributions, continuous random variables and probability distributions, joint probability distributions, random sampling and data description, point estimation of parameters, statistical intervals for a single sample, and tests of hypotheses for a single sample.

Course Requirement: Required

Student Learning Outcomes:

After completing this course, students should be able to (the numbering does not necessarily imply any ordering):

1. Demonstrate knowledge of the role of statistics in engineering
2. Demonstrate knowledge of descriptive statistics
3. Demonstrate knowledge of probability, random variables, and their distributions
4. Demonstrate knowledge of linear functions of random variables
5. Demonstrate knowledge of sampling distributions and point estimation of parameters
6. Demonstrate knowledge of statistical intervals for a single sample

Course Topics

The following is a tentative ordered list of the course content derived from the text. Some of these sections will only be partially covered. Students should carefully read and study these sections before they are covered in class.

1. Chapter 1, Sections 1-1 through 1-4
2. Chapter 6, Sections 6-1 through 6-6
3. Chapter 2, Sections 2-1 through 2-8
4. Chapter 3, Sections 3-1 through 3-9
5. Chapter 4, Sections 4-1 through 4-10
6. Chapter 5, Section 5-4
7. Chapter 7, Sections 7-1 through 7-3
8. Chapter 8, Sections 8-1 through 8-5

ABET ADDENDUM for IE 211

IE Course Competencies (IECCs)

1. Demonstrate knowledge of the role of statistics in engineering
2. Demonstrate knowledge of descriptive statistics
3. Demonstrate knowledge of probability, random variables, and their distributions
4. Demonstrate knowledge of linear functions of random variables
5. Demonstrate knowledge of sampling distributions and point estimation of parameters
6. Demonstrate knowledge of statistical intervals for a single sample

Relationship of Student Outcomes (a)-(k) to IECCs

IECCs	IE Student Outcomes	
1, 2, 3, 4, 5, 6		(a) An ability to apply knowledge of mathematics, science, and engineering
1, 2, 5, 6		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
1, 2, 3, 4, 5, 6		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
2, 5, 6		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
2, 3, 4, 5, 6		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 305 Facilities Planning and Management
3 credits / 3 Lecture

Instructor: Sukwon Kim, PhD.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Nahmias, S., Production and Operations Analysis, 6th edition, Irwin McGraw-Hill, 2009.

Free Textbook, download Warehouse & Distribution Science by J. Bartholdi and S. Hackman from <http://www.warehouse-science.com/>

Course Description:

Introduction to manufacturing systems and facilities planning; models for determining basic behavior of production lines; principles and practice of the planning of facilities layout and material handling; analytical approaches in facility location; line balancing methods; material handling problems

Course Requirement: Required

Student Learning Outcomes:

Having successfully completed this course, the student will be able to:

1. Understand and analyze a manufacturing system.
2. Understand and evaluate product/production relationships.
3. Evaluate and analyze manufacturing facility performance.
4. Understand line balancing and material flow lines.
5. Solve basic plant layout and facility location problems.
6. Understand principles of material handling.

Course Topics

1. Product/Production relationships
2. Cost of manufacturing operations
3. Science of manufacturing facilities design
4. Facilities performance (WIP, TH, CT)
5. Production line behavior
6. Flow line design in manufacturing facilities
7. Scheduling material flow (JIT, Push, Pull, MRP)
8. Facilities scheduling
9. Supply chain management
10. Facilities layout and location
11. Material handling

ABET ADDENDUM for IE 305

IE Course Competencies (IECCs)

1. Understand and analyze a manufacturing system.
2. Understand and evaluate product/production relationships.
3. Evaluate and analyze manufacturing facility performance.
4. Understand line balancing and material flow lines.
5. Solve basic plant layout and facility location problems.
6. Understand principles of material handling.

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
1-5		(a) An ability to apply knowledge of mathematics, science, and engineering
1-6		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
1-6		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
5		(e) An ability to identify, formulate, and solve engineering problems
5		(f) An understanding of professional and ethical responsibility
3,5		(g) An ability to communicate effectively
5		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
6		(j) A knowledge of contemporary issues
5		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 311 Advanced Engineering Statistics
3 credits / 3 Lecture

Instructor: Matthew E. Elam, PhD.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Optional: Montgomery, Douglas C. and Runger, George C. (2007). *Applied Statistics and Probability for Engineers*, Fourth Edition. John Wiley & Sons, Inc. [ISBN 0-471-74589-8].

Required Materials: Students will need a scientific calculator, preferably one with built-in statistical functions.

Course Description:

This course examines model building, design of experiments, multiple regression, non-parametric techniques, contingency tables and introduction to response surfaces, decision theory and time series data

Course Requirement: Required

Student Learning Outcomes:

After completing this course, students should be able to (the numbering does not necessarily imply any ordering):

1. Demonstrate knowledge of statistical inference for a single sample
2. Demonstrate knowledge of statistical inference for two samples
3. Demonstrate knowledge of simple linear regression and correlation
4. Demonstrate knowledge of multiple linear regression
5. Demonstrate knowledge of the design and analysis of single-factor experiments (the analysis of variance)
6. Demonstrate knowledge of design of experiments with several factors

Course Topics

The following is a tentative ordered list of the course content derived from the text. Some of these sections will only be partially covered. Students should carefully read and study these sections before they are covered in class.

1. Chapter 9, Sections 9-1, 9-2, 9-3, 9-4, 9-5, 9-6
2. Chapter 10, Sections 10-1, 10-2, 10-3, 10-4, 10-5, 10-6, 10-7
3. Chapter 11, Sections 11-1, 11-2, 11-3, 11-4, 11-5, 11-6, 11-7, 11-8, 11-9
4. Chapter 12, Sections 12-1, 12-2, 12-3, 12-4, 12-5, 12-6
5. Chapter 13, Sections 13-1, 13-2, 13-3, 13-4
6. Chapter 14, Sections 14-1, 14-2, 14-3, 14-4

ABET ADDENDUM for IE 311

IE Course Competencies (IECCs)

1. Demonstrate knowledge of statistical inference for a single sample
2. Demonstrate knowledge of statistical inference for two samples
3. Demonstrate knowledge of simple linear regression and correlation
4. Demonstrate knowledge of multiple linear regression
5. Demonstrate knowledge of the design and analysis of single-factor experiments (the analysis of variance)
6. Demonstrate knowledge of design of experiments with several factors

Relationship of Student Outcomes (a)-(k) to IECCs

IECCs	IE Student Outcomes	
1, 2, 3, 4, 5, 6		(a) An ability to apply knowledge of mathematics, science, and engineering
1, 2, 3, 4, 5, 6		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
1, 2, 3, 4, 5, 6		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
1, 2, 5, 6		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
1, 2, 3, 4, 5, 6		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 312 Industrial Operations Research I
3 credits / 3 Lecture

Instructor: E. Delbert Horton, PhD., P.E.
Department (e.g. Department of Engineering & Technology)

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Operations Research Applications and Algorithms, 4th edition, Wayne L. Winston, Duxbury Press, ISBN 0-534-39059-1 includes software package.

Reference Materials: Contemporary Linear Algebra, Howard Anton and Robert C. Busby, John Wiley & Sons, Inc. ISBN 0-471-16362-7

Operations Research, An Introduction, 8th Edition, Hamdy A. Taha, Prentice Hall, ISBN 0-13-188923-0

Course Description: This course focuses on the application of deterministic numerical methods to the solution of resource allocation, distribution, and quality control problems in business and industrial settings. Some techniques covered are decision theory, statistical process control, linear programming, and queuing theory. Prerequisite: Math 191

Course Requirement: Required

Student Learning Outcomes:

Upon satisfactory completion of the course, the student as an operations research analyst will:

1. be able to define an organization problem including specifying the objectives and parts of the system that must be analyzed before the problem is solved.
2. be able understand the basic building blocks of linear algebra, matrices, and vectors analysis.
3. be able to apply the knowledge of matrices and vectors to develop a systematic procedure (e.g. Gauss-Jordan method) to solve linear system of equations.
4. be able to collect data to estimate the values of parameters that affects the above problem.
5. be able to develop a mathematical model of the problem.
6. be able to determine if the mathematical model developed is an accurate representation of reality.

7. given the model, the student will be able to choose the alternative that best meets the objectives.
8. be able to understand the sensitivity analysis of an optimum solution.
9. be able to present the results and conclusions to the organization.
10. be able to aid in implementing the recommendations for the organization.

Course Topics

- Lecture 1: Introduction to operations research
- Lecture 2: Review linear algebra concepts
- Lecture 3: Review linear algebra concepts
- Lecture 4: Chapter 1
- Lecture 5: Chapter 2
- Lecture 6: Chapter 3.1 & 3.2
- Lecture 7: Chapter 3.2
- Lecture 8: Chapter 3.2 & 3.3
- Lecture 9: Chapter 3.3 & 3.4
- Lecture 10: Chapter 3.4 & 3.5
- Lecture 11: Chapter 3.5
- Lecture 12: Chapter 3.5 & 3.6
- Lecture 13: Chapter 3.7
- Lecture 14: Chapter 3.8
- Lecture 15: Chapter 3.8
- Lecture 16: Chapter 3.9
- Lecture 17: Chapter 3.9
- Lecture 18: Chapter 3.10
- Lecture 19: Chapter 3.10
- Lecture 20: Chapter 4.1 & 4.5
- Lecture 21: Chapter 4.5
- Lecture 22: Chapter 4.5
- Lecture 23: Chapter 4.4 & 5.1
- Lecture 24: Chapter 5.1
- Lecture 25: Chapter 5.2
- Lecture 26: Chapter 5.3
- Lecture 27: Review of course

ABET ADDENDUM for IE 312,

IE Course Competencies (IECCs)

Upon satisfactory completion of the course, the student as an operations research analyst will:

1. be able to define an organization problem including specifying the objectives and parts of the system that must be analyzed before the problem is solved.
2. be able understand the basic building blocks of linear algebra, matrices, and vectors analysis.
3. be able to apply the knowledge of matrices and vectors to develop a systematic procedure(e.g. Gauss-Jordan method) to solve linear system of equations.
4. be able to collect data to estimate the values of parameters that affects the above problem.
5. be able to develop a mathematical model of the problem.
6. be able to determine if the mathematical model developed is an accurate representation of reality.
7. given the model, the student will be able to choose the alternative that best meets the objectives.
8. be able to understand the sensitivity analysis of an optimum solution.
9. be able to present the results and conclusions to the organization.
10. be able to aid in implementing the recommendations for the organization.

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
1-3		(a) An ability to apply knowledge of mathematics, science, and engineering
4		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
5,10		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
1,8		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
9		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 313 Industrial Operations Research II
3 credits / 3 Lecture

Instructor: E. Delbert Horton, Ph.D., P.E.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: OPERATIONS RESEARCH Applications and Algorithms, 4th ed, Wayne L. Winston, Duxbury Press, ISBN 0-534-38058-1 includes software package.

Reference Materials: OPERATIONS RESEARCH: AN INTRODUCTION, 7th edition, Hamdy A. Taha, Prentice Hall, ISBN 0-13-032374-8.

INTRODUCTION TO OPERATIONS RESEARCH, 8th Edition, Frederick S. Hillier, Gerald J. Lieberman, McGraw Hill Higher Education, ISBN 0-07-301779-5

Course Description This course focuses on the application of deterministic numerical methods to the solution of resource allocation, distribution, and quality control problems in business and industrial settings. Some techniques covered are decision theory, statistical process control, linear programming, and queuing theory. Prerequisite: IE 312

Course Requirement: Required

Student Learning Outcomes:

Upon satisfactory completion of the course, the student as an operations research analyst will:

1. Be able to define an organization problem including specifying the objectives and components of the system that must be analyzed before the problem is solved.
2. Be able to collect data to estimate the values of parameters that affects the above problem.
3. Be able to develop a mathematical model of the problem.
4. Be able to determine if the mathematical model developed is an accurate representation of reality.
5. The student must be able to demonstrate understanding of decision making in uncertain environment.

6. The student must be able to understand how linear programming can be used to solve certain inventory problems.
7. The student must be able to set up inventory problems in which the demand over a given time period is uncertain, or random.
8. Be able to set up and solve(using Solver or LINDO or LINGO) Integer Programming problems
9. Be able to set up and solve linear programming problems using the network models.
10. Be able to set up and solve three special types of linear programming problems: transportation, assignment and transshipment.

Course Topics

- | | |
|---|------------|
| 1. Transportation, Assignment & Transshipment | Chapter 7 |
| 2. Network Models | Chapter 8 |
| 3. Integer Programming | Chapter 9 |
| 4. Deterministic EOQ Inventory Modules | Chapter 15 |
| 5. Probabilistic Inventory Models | Chapter 16 |
| 6. Decision Making under Uncertainty | Chapter 13 |

ABET ADDENDUM for IE 313

IE Course Competencies (IECCs)

Upon satisfactory completion of the course, the student as an operations research analyst will:

1. Be able to define an organization problem including specifying the objectives and components of the system that must be analyzed before the problem is solved.
2. Be able to collect data to estimate the values of parameters that affects the above problem.
3. Be able to develop a mathematical model of the problem.
4. Be able to determine if the mathematical model developed is an accurate representation of reality.
5. The student must be able to demonstrate understanding of decision making in uncertain environment.
6. The student must be able to understand how linear programming can be used to solve certain inventory problems.
7. The student must be able to set up inventory problems in which the demand over a given time period is uncertain, or random.
8. Be able to set up and solve(using Solver or LINDO or LINGO) Integer Programming problems
9. Be able to set up and solve linear programming problems using the network models.
10. Be able to set up and solve three special types of linear programming problems: transportation, assignment and transshipment.

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
1-7		(a) An ability to apply knowledge of mathematics, science, and engineering
2		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
1-10		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
8		(d) An ability to function on multidisciplinary teams
1-10		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
1-10		(g) An ability to communicate effectively
9, 10		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
9, 10		(j) A knowledge of contemporary issues
8		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 314 Statistical Quality Control
3 credits / 3 Lecture

Instructor: Matthew E. Elam, PhD.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Montgomery, Douglas C. (2009). Introduction to Statistical Quality Control, Sixth Ed. John Wiley and Sons, Inc. [978-0-470-16992-6].

Required Materials: CALCULATOR: Students will need a scientific calculator, preferably one with built-in statistical functions.

Course Description:

A comprehensive coverage of modern quality control techniques to include the design of statistical process control systems, acceptance sampling, and process improvement

Course Requirement: Required

Student Learning Outcomes:

After completing this course, students should be able to (the numbering does not necessarily imply any ordering):

1. Demonstrate knowledge of quality improvement in the modern business environment
2. Demonstrate knowledge of the DMAIC process
3. Demonstrate knowledge of the methods and philosophy of statistical process control
4. Demonstrate knowledge of variables control charts
5. Demonstrate knowledge of attributes control charts
6. Demonstrate knowledge of process capability analysis
7. Demonstrate knowledge of exponentially weighted moving average and moving average control charts

Course Topics

The following is a tentative ordered list of the course content derived from the text. Some of these sections will only be partially covered. Students should carefully read and study these sections before they are covered in class.

1. Chapter 1, Sections 1.1-1.4
2. Chapter 2, Sections 2.1-2.6
3. Chapter 5, Sections 5.1-5.5
4. Chapter 6, Sections 6.1-6.6
5. Chapter 7, Sections 7.1-7.5
6. Chapter 8, Sections 8.1-8.4
7. Chapter 9, Sections 9.3, 9.2

ABET ADDENDUM for IE 314

IE Course Competencies (IECCs)

1. Demonstrate knowledge of quality improvement in the modern business environment
2. Demonstrate knowledge of the DMAIC process
3. Demonstrate knowledge of the methods and philosophy of statistical process control
4. Demonstrate knowledge of variables control charts
5. Demonstrate knowledge of attributes control charts
6. Demonstrate knowledge of process capability analysis
7. Demonstrate knowledge of moving average control charts

Relationship of Student Outcomes (a)-(k) to IECCs

IECCs	IE Student Outcomes	
4, 5, 6, 7		(a) An ability to apply knowledge of mathematics, science, and engineering
		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
1, 2, 3		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
4, 5, 6, 7		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
		(g) An ability to communicate effectively
1, 2, 3		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
4, 5, 6, 7		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 316 Manufacturing Systems Design and Control
3 credits / 3 Lecture

Instructor: Sukwon Kim, PhD., Assistant Professor.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Benjamin Niebel and Andris Freivalds, 2009, Methods, Standards, and Work Design, 12th edition, McGraw-Hill Higher Education

Course Description:

This course will cover methods improvement, work measurement, and work design, applied to manufacturing and service industries, so as to increase productivity and improve worker health and safety

Course Requirement: Required

Student Learning Outcomes:

Having successfully completed this course, the student will be able to:

1. Understand professional and ethical responsibility.
2. Perform work measurement: carry out a work sampling study, and perform ratings.
3. To eliminate ineffective motions, to produce faster or more effective motions.
4. Understand the impact of engineering solutions (operation analysis)
5. Design work and work place according to human capabilities and limitations.
6. Use technique for recording times and rates of working for specific job elements using a stopwatch.
7. Perform work measurement: carry out a work sampling study, and perform ratings.
8. Understand predetermined time systems.

Course Topics

1. Exploratory tools
2. Recording and analysis tools
3. Worker and machine relationships
4. Operation analysis
5. Manual work design
6. Time study
7. Predetermined time study
8. CTD index
9. Workplace and systems safety

ABET ADDENDUM for IE 316

IE Course Competencies (IECCs)

1. Understand professional and ethical responsibility.
2. Perform work measurement: carry out a work sampling study, and perform ratings.
3. To eliminate ineffective motions, to produce faster or more effective motions.
4. Understand the impact of engineering solutions (operation analysis)
5. Design work and work place according to human capabilities and limitations.
6. Use technique for recording times and rates of working for specific job elements using a stopwatch.
7. Perform work measurement: carry out a work sampling study, and perform ratings.
8. Understand predetermined time systems.

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
2,4,5,7,8		(a) An ability to apply knowledge of mathematics, science, and engineering
2,3,4,6,7		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
2,3,4,6,7		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
2,3,4,6,7		(d) An ability to function on multidisciplinary teams
2,3,4,7		(e) An ability to identify, formulate, and solve engineering problems
1		(f) An understanding of professional and ethical responsibility
1-8		(g) An ability to communicate effectively
1-8		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
7		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 403 Human Factors Engineering
3 credits / 3 Lecture

Instructor: Sukwon Kim, Ph.D.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Christopher D.W., John D.L., Yili L., and Sallie G.B., 2004, An introduction to human factors engineering, 2nd Pearson Prentice Hall, New Jersey

Course Description:

Study of people at work: designing for human performance effectiveness and productivity, an introduction to the relevant underlying human sciences. Theory, data, and measurement problems in human information processing, anthropometry, training and industrial safety. Consideration the human physiological and psychological factors that underlie the design of equipment and the interaction between people and machines

Course Requirement: Required

Student Learning Outcomes:

Having successfully completed this course, the student will:

1. Describe in writing the meaning and importance of human factors engineering, with reference materials.
2. Describe in writing and/or by illustrations human sensory, cognitive, and physical capabilities and limitations relevant to the design of human-machine systems, with reference materials.
3. Correctly apply human-machine system design principles to develop written and graphical design specifications, with reference materials.
4. Select and correctly use appropriate human-machine system analysis and design tools, with reference materials.
5. Recognize and make effective recommendations in written and/or graphical form to correct human factors deficiencies in existing human-machine systems, with reference materials.
6. Describe in writing and/or by illustrations the human-machine systems engineering process, with reference materials.

7. Correctly apply the human-machine systems engineering process by developing analysis documents and design specifications for a simple human-machine system, with reference materials.
8. Design human computer interfaces for information processing and control.
9. Understand professional and ethical responsibility
10. Understand the impact of engineering solutions in a global and societal context.

Course Topics

1. Human factors
2. Evaluation methods
3. Visual sensory systems
4. Auditory system design
5. Workplace design
6. Cognitive engineering
7. Control design
8. Anthropometry & work place design
9. Muscular skeletal system
10. Biomechanics of work
11. Work physiology

ABET ADDENDUM for IE 403

IE Course Competencies (IECCs)

1. Describe in writing the meaning and importance of human factors engineering, with reference materials.
2. Describe in writing and/or by illustrations human sensory, cognitive, and physical capabilities and limitations relevant to the design of human-machine systems, with reference materials.
3. Correctly apply human-machine system design principles to develop written and graphical design specifications, with reference materials.
4. Select and correctly use appropriate human-machine system analysis and design tools, with reference materials.
5. Recognize and make effective recommendations in written and/or graphical form to correct human factors deficiencies in existing human-machine systems, with reference materials.
6. Describe in writing and/or by illustrations the human-machine systems engineering process, with reference materials.
7. Correctly apply the human-machine systems engineering process by developing analysis documents and design specifications for a simple human-machine system, with reference materials.
8. Design human computer interfaces for information processing and control.
9. Understand professional and ethical responsibility.
10. Understand the impact of engineering solutions in a global and societal context.

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
6,7		(a) An ability to apply knowledge of mathematics, science, and engineering
2, 10		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
3,5,8,10		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
8		(d) An ability to function on multidisciplinary teams
1, 2, 4		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
2, 6		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
1		(j) A knowledge of contemporary issues
9		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 407 Prod Systems Operations
3 credits / 3 Lecture

Instructor: Sukwon Kim, PhD., Assistant Professor.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Nahmias, S., *Production and Operations Analysis*, 6th edition, Irwin McGraw-Hill, 2009.

Course Description:

Introduction to production and service systems. Production planning and control in decision making. Forecasting. Aggregate production planning. Capacity planning. Materials requirement planning. Scheduling. Advanced techniques and approaches in modern production planning and control for designing manufacturing and service systems.

Course Requirement: Required

Student Learning Outcomes:

Upon successful completion of this course, the student will be able to

1. Become aware of major production planning concerns and decision chains, fundamental problem areas in production planning and control, planning hierarchy and the relations with the management activities.
2. Understand the importance of applying systems concept in analyzing production planning related problems.
3. Demonstrate how qualitative and quantitative forecasting techniques can be used in short, medium, and long range forecasting.
4. Solve production-related problems by the application of linear programming.
5. Solve inventory-related problems using deterministic or stochastics modeling.
6. Conceptualize the planning problems, and have the appropriate analytical skills and tools to solve these problems.

Course Topics

1. Forecasting
2. Aggregate planning
3. Linear programming
4. Inventory control and planning
5. Push and pull production control
6. Operations scheduling
7. Wait line process
8. Wait line distribution

ABET ADDENDUM for IE 407

IE Course Competencies (IECCs)

1. Become aware of major production planning concerns and decision chains, fundamental problem areas in production planning and control, planning hierarchy and the relations with the management activities.
2. Understand the importance of applying systems concept in analyzing production planning related problems.
3. Demonstrate how qualitative and quantitative forecasting techniques can be used in short, medium, and long range forecasting.
4. Solve production-related problems by the application of linear programming.
5. Solve inventory-related problems using deterministic or stochastic modeling.
6. Conceptualize the planning problems, and have the appropriate analytical skills and tools to solve these problems.

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
3,4,5,6		(a) An ability to apply knowledge of mathematics, science, and engineering
		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
1, 2		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
3,4,5,6		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
3,4,5,6		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 410 Systems Simulation
3 credits / 3 Lecture

Instructor: Matthew E. Elam, Ph.D.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Kelton, W. David, Sadowski, Randall P., and Swets, Nancy B. (2010). Simulation with Arena, Fifth Edition. McGraw-Hill Higher Education [978-0-07-337628-8]

Required Materials: CALCULATOR: Students will need a scientific calculator, preferably one with built-in statistical functions.

Course Description:

The application of computer simulation to industrial settings is taught. Areas covered include system structure, system analysis, model construction, data collection, and computer simulation languages. The application of simulation to facilities layout for manufacturing is emphasized.

Course Requirement: Required

Student Learning Outcomes:

After completing this course, students should be able to (the numbering does not necessarily imply any ordering):

1. Demonstrate knowledge of modeling, computer simulation, how simulations get done, and when simulations are used
2. Demonstrate knowledge of fundamental simulation concepts
3. Demonstrate knowledge of Arena
4. Demonstrate knowledge of modeling basic operations and inputs
5. Demonstrate knowledge of modeling detailed operations
6. Demonstrate knowledge of the statistical analysis of output from terminating simulations
7. Demonstrate knowledge of how to conduct simulation studies

Course Topics

The following is a tentative ordered list of the course content derived from the text. Some of these sections will only be partially covered. Students should carefully read and study these sections before they are covered in class.

1. Chapter 1, Sections 1.1-1.4
2. Chapter 2, Sections 2.1-2.6, 2.8, 2.9
3. Chapter 3, Sections 3.1-3.10
4. Chapter 4, Sections 4.1-4.8
5. Chapter 5, Sections 5.1-5.5, 5.8, 5.9
6. Chapter 6, Sections 6.1-6.4, ANOVA, 6.7, 6.8
7. Chapter 13, Sections 13.1-13.9

ABET ADDENDUM for IE 410

IE Course Competencies (IECCs)

1. Demonstrate knowledge of modeling, computer simulation, how simulations get done, and when simulations are used
2. Demonstrate knowledge of fundamental simulation concepts
3. Demonstrate knowledge of Arena
4. Demonstrate knowledge of modeling basic operations and inputs
5. Demonstrate knowledge of modeling detailed operations
6. Demonstrate knowledge of the statistical analysis of output from terminating simulations
7. Demonstrate knowledge of how to conduct simulation studies

Relationship of Student Outcomes (a)-(k) to IECCs

IECCs	IE Student Outcomes	
2, 3, 4, 5, 6		(a) An ability to apply knowledge of mathematics, science, and engineering
4, 5, 6		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
4, 5		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
4, 5, 6, 7		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
4, 5, 6		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
3, 4, 5, 6		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 411 Engineering Management
3 credits / 3 Lecture

Instructor: E. Delbert Horton, PhD., P.E.
Department (e.g. Department of Engineering & Technology)

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: **Project Management, the managerial process, Fourth Edition**, Clifford F. Gray, Erik W. Larson. ISBN 978-0-07-352515 , @2008

Reference Materials: **Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 9th Edition**, Harold Kerzner, Ph.D., Baldwin-Wallace College, Bera, Ohio, ISBN: 978-0-471-74187-9, @2006, 1040 pages

Engineering Management, Robert E. Shannon, ISBN: 0-471-03408

Developing Managerial Skills in Engineers and Scientist, Second Edition, Michael K. Badawy, ISBN: 0-471-28634-6

Course Description: Techniques relating to managing engineering activities; engineer's transition into management; engineering managerial functions; motivation of individual and group behavior; productivity assessment/improvement; managing the quality function and communications. This course will also teach the team approach to understand how the design, planning, implementation, tracking and close out of a project should be managed on an industrial-level project. The student must be an IE major and senior classification or consent of department head.

Course Requirement: Required

Student Learning Outcomes:

Upon completion of this course, the student will be able to:

1. demonstrate the role of teaming in an industrial environment,
2. identify and use the tools of project management,
3. effectively use project reporting tools and techniques,
4. understand and appraise the changing business climate and how the changes have impacted project management

5. understand the importance of risk, cost, schedule and resource control and management of a project,
6. understand the need for effective project management skills, training and the specific training needs of project managers,
7. demonstrate an understanding of the role of Project Management vs. Functional Management,
8. write clear goal and objective statements and establish measurable criteria for project success,
9. verbalize and apply an understanding of the risk management process, and
10. encourage and be exposed to examples and cases of applications dealing with engineering ethics (emphasis of the global influences on this issue).

Course Topics

1. Organization strategy and project selection
2. Organization structure and culture
3. Defining the project
4. Estimate project time and costs
5. Developing a project plan
6. Managing risk
7. Scheduling resources and costs
8. Progress and performance measurement
9. Engineering ethics

ABET ADDENDUM for IE 411

IE Course Competencies (IECCs)

1. demonstrate the role of teaming in an industrial environment,
2. identify and use the tools of project management,
3. effectively use project reporting tools and techniques,
4. understand and appraise the changing business climate and how the changes have impacted project management
5. understand the importance of risk, cost, schedule and resource control and management of a project,
6. understand the need for effective project management skills, training and the specific training needs of project managers,
7. demonstrate an understanding of the role of Project Management vs. Functional Management,
8. write clear goal and objective statements and establish measurable criteria for project success,
9. verbalize and apply an understanding of the risk management process, and
10. encourage and be exposed to examples and cases of applications dealing with engineering ethics (emphasis of the global influences on this issue).

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
	(a)	An ability to apply knowledge of mathematics, science, and engineering
	(b)	An ability to design and conduct experiments, as well as to analyze and interpret data
	(c)	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
1,8,9	(d)	An ability to function on multidisciplinary teams
	(e)	An ability to identify, formulate, and solve engineering problems
10	(f)	An understanding of professional and ethical responsibility
5,6	(g)	An ability to communicate effectively
10	(h)	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
7	(i)	A recognition of the need for, and an ability to engage in life-long learning
4,7	(j)	A knowledge of contemporary issues
2,3	(k)	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 431 Principles of Programmable Automation
3 credits / 2 Lecture – 2 Lab

Instructor: Dr. Brent Donham, Department Head & Associate Professor
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Groover, M. P. (2008) *Automation, Production Systems, and Computer-Integrated Manufacturing*, 3rd Ed. Pearson Education. ISBN 0-13-239321-2.

Required Materials: 1) Bound notebook, such as a composition notebook (Available at the A&M-Commerce bookstore or any office supply store)
2) Scientific calculator

Reference Materials: American Psychological Association (APA). (2009). *Publication Manual of the American Psychological Association*, 6th Ed. ISBN 1-4338-0561-8.

Course Description

Concepts, principles, and relationships of automated assembly devices, computer aided drafting/design (CADD), computer-aided manufacturing (CAM), industrial robots, numerical control (NC), industrial lasers, programmable logic controllers (PLCs), automated guided vehicles (AGVs), flexible manufacturing systems (FMS), and computer- integrated manufacturing (CIM). Prerequisite: Consent of instructor.

Course Requirement: Required

Student Learning Outcomes:

Upon satisfactory completion of the course, the student will be able to:

1. Explain various reasons for employing automation in a manufacturing environment and describe various applications.
2. Describe the basic function of a sensor and an actuator in an automated system and give examples of both categories.
3. Select an appropriate sensor and/or actuator for a given automated application.
4. Describe the fundamentals of NC technology.

5. Use a Programmable Logic Controller (PLC) and embedded microcontroller, to perform specified control functions.
6. Describe the basic anatomy and attributes of an industrial robot.
7. Identify and distinguish the different components and interfaces in a Flexible Manufacturing System.
8. Troubleshoot a system and take appropriate action(s) to resolve the issue(s).
9. Design an automated system to meet defined operational specifications.
10. Research and summarize

Course Topics

Units of Study

Unit I – Introduction to Automation

- Basic principles and strategies of automation (Chapter 1)
- Overview of manufacturing operations (Chapter 2)
- Basic elements of an automated system (Chapter 4)
- Overview of industrial control systems (Chapter 5)
- Hardware components; sensors, actuators, ADC, DAC (Chapter 6)

Unit II – Automation and Process Control

- Logic control systems (Chapter 9)
- Programmable Logic Controllers (Chapter 9)
- Microcontrollers (Chapter 5)

Unit III – Robotics and Automated Manufacturing Systems

- Industrial robotics (Chapter 8)
- NC technology (Chapter 7)
- Flexible manufacturing systems (Chapter 19)
- Computer Integrated Manufacturing (Chapter 23)

ABET ADDENDUM for IE 431

IE Course Competencies (IECCs)

1. Explain various reasons for employing automation in a manufacturing environment and describe various applications.
2. Describe the basic function of a sensor and an actuator in an automated system and give examples of both categories.
3. Select an appropriate sensor and/or actuator for a given automated application.
4. Describe the fundamentals of NC technology.
5. Use a Programmable Logic Controller (PLC) and embedded microcontroller, to perform specified control functions.
6. Describe the basic anatomy and attributes of an industrial robot.
7. Identify and distinguish the different components and interfaces in a Flexible Manufacturing System (FMS).
8. Troubleshoot a system and take appropriate action(s) to resolve the issue(s).
9. Design an automated system to meet defined operational specifications.
10. Research and summarize a unique technology and/or application in the field of robotics or automation.

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IEPOs	
3,5,8		(a) An ability to apply knowledge of mathematics, science, and engineering
5,8		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
5,8,9		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
5,8,9		(d) An ability to function on multidisciplinary teams
3,5,8,9		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
1,2,4,6,7,10		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
10		(j) A knowledge of contemporary issues
5,8,9		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 444 Systems Engineering
3 credits / 3 Lecture

Instructor: E. Delbert Horton, Ph.D., P.E.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Blanchard, B.S., and Fabrycky, W.J. (2006). Systems Engineering and Analysis (4th Ed). Pearson Prentice Hall: Upper Saddle River, NJ (ISBN 0-13-186877-9)

Course Description:

The emphasis of this course is on the process of bringing systems into being, beginning with the identification of a need and extending through requirements determination, functional analysis and allocation, design synthesis, evaluation, and validation, operation and support, phase-out, and disposal. Additional emphasis is placed on the improvement of systems now in existence. An iterative process of analysis, evaluation, feedback, and modification will be emphasized to show how most systems in existence can be improved in their affordability, effectiveness, and stakeholder satisfaction.

Course Requirement: Required

Student Learning Outcomes:

1. The student will demonstrate an understanding of systems terminology, definitions, and the design process.
2. The student will demonstrate the ability to solve systems engineering problems from information/data provided and from information/data developed during the course.
3. The student will demonstrate critical analysis skills by applying tools, methodologies, and procedures specified during the course to solve selected systems engineering problems.
4. The student will demonstrate an understanding of systems engineering processes involved in developing effective systems solutions for large-scale industrial systems.
5. The student will be able to evaluate alternative methods for improving systems designed for human and non-human use.
6. The student will demonstrate the ability to analyze existing (and proposed) processes to support safe, efficient, and reliable human-centered designs.

7. The student will demonstrate a knowledge of systems engineering terminology as it applies to the design, operation, maintenance, and support of modern technological systems.
8. The student will demonstrate an understanding of the positive aspects and limitations associated with using derived and embedded constraints while attempting to satisfy customer requirements.
9. The student will be able to employ systems engineering analytical tools, techniques, methodologies, and processes to assist development teams in designing efficient and cost-effective design solutions.
10. Students are expected to demonstrate their understanding of current issues in Systems Engineering discipline with readings

Course Topics

1. Systems into being
2. Conceptual system design
3. Preliminary system design
4. Design for reliability
5. Design for maintainability
6. Design and development
7. System test, evaluation and validation
8. Design for affordability (life-cycle costing)

ABET ADDENDUM for IE 444

IE Course Competencies (IECCs)

1. The student will demonstrate an understanding of systems terminology, definitions, and the design process.
2. The student will demonstrate the ability to solve systems engineering problems from information/data provided and from information/data developed during the course.
3. The student will demonstrate critical analysis skills by applying tools, methodologies, and procedures specified during the course to solve selected systems engineering problems.
4. The student will demonstrate an understanding of systems engineering processes involved in developing effective systems solutions for large-scale industrial systems.
5. The student will be able to evaluate alternative methods for improving systems designed for human and non-human use.
6. The student will demonstrate the ability to analyze existing (and proposed) processes to support safe, efficient, and reliable human-centered designs.
7. The student will demonstrate a knowledge of systems engineering terminology as it applies to the design, operation, maintenance, and support of modern technological systems.
8. The student will demonstrate an understanding of the positive aspects and limitations associated with using derived and embedded constraints while attempting to satisfy customer requirements.
9. The student will be able to employ systems engineering analytical tools, techniques, methodologies, and processes to assist development teams in designing efficient and cost-effective design solutions.
10. Students are expected to demonstrate their understanding of current issues in Systems Engineering discipline with readings and research on current issues and presenting their findings to their classmates.

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
2,3,5		(a) An ability to apply knowledge of mathematics, science, and engineering
		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
1,4,5,6, 7,8,9		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
9		(d) An ability to function on multidisciplinary teams
2, 3		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
10		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
10		(j) A knowledge of contemporary issues
2,6,7, 9,10		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



**IE 471 Plan for Industrial System Design
3 Credits / 3 Lecture**

Instructor: E. Delbert Horton, PhD., P.E.
Department (e.g. Department of Engineering & Technology)

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: The Team Handbook, 3rd, Peter R. Scholtes, Brian L. Joiner, Barbara J. Streibel, Oriel Incorporated, ISBN 1-884731-266-0, February 2003

Reference Materials: FACILITIES PLANNING 3RD Edition, Tompkins et al, John Wiley, ISBN 0-471-41389-5

FACILITY DESIGN: Manufacturing Engineering, S. Konz, Publishing Horizons, Inc., 2nd Edition, 1994

MANUFACTURING FACILITIES: Location, Planning and Design, D.R. Sule, PWS Publishing Company, 2nd edition, 1994

FACILITY LAYOUT AND LOCATION : An Analytical Approach, R.L. Francis and J.A. White, Prentice-Hall, 1974

METHODS, STANDARDS, AND WORK DESIGN, 11th edition, Benjamin Niebel and Andris Freivalds, McGraw-Hill Higher Education, ISBN 0-070246824-6

SIMULATION WITH ARENA, 2nd edition, W. David Kelton, Randall P. Sadowski, Deborah A. Sadowski, McGraw Hill, 2002. 0-07-239270-3

INTRODUCTION TO STATISTICAL QUALITY CONTROL, 4th edition, Douglas C. Montgomery, John Wiley & Sons, Inc. ISBN 0-471-31648-2

OPERATIONS RESEARCH Applications and Algorithms, 3rd edition, Wayne L. Winston, Duxbury Press, ISBN 0-534-520200 includes software package

PROJECT MANAGEMENT, THE MANAGERIAL PROCESS, FOURTH EDITION, Clifford F. Gray, Erik W. Larson, ISBN 978-0-07-352515 @2008

ENGINEERING COST ESTIMATING, 3rd edition, Phillip F. Oswald, Prentice Hall, 1992, ISBN 0-13-276627-2

Course Description: Student teams prepare a proposal (technical and management sections) to outline the approach and methodology the team plans to follow in working with industry sponsors on real-world industrial engineering process improvement activities. The proposed improvement activity will be the systems design project planned for the following spring semester in

IE 495, Industrial Systems Design. Prerequisite: Senior Classification, IE Majors Only, course must be scheduled in the fall semester prior to the student's IE 495 enrollment in the final spring semester, and consent of instructor.

Course Requirement: Required

Student Learning Outcomes:

Upon satisfactory completion of the course, the student as an industrial system designer will:

1. Apply the engineering design process and application of quantitative tools as a foundation for demonstrating the proposed approach is a valid approach for the team's industrial design project.
2. Become acquainted with the using adaptability property as criteria in the industrial design process.
3. Be able to define the physical requirements for the proposed design project.
4. Be able to relate system design requirements to specific work structure activity
5. Be able to prepare a schedule of the proposed personnel requirements in the approach.
6. Develop an overview of principles of system operations.
7. Develop an overview of available computer-aided design algorithms required for the project.
8. Be able to propose a model system design requirements for project process.
9. Be able to relate the proposed model components to implemental system level components.
10. Be able to layout, prepare and present the proposed system operations in a presentation with visual aides describing the system, final project proposal, highlighting the proposed system solution implementation.

Course Topics

Team Dynamic Examinations

Statement of the problem and plant(s) tour

Project Proposal

Project Proposal Presentation to Client

ABET ADDENDUM for IE 471

IE Course Competencies (IECCs)

1. Apply the engineering design process and application of quantitative tools as a foundation for demonstrating the proposed approach is a valid approach for the team’s industrial design project.
2. Become acquainted with the using adaptability property as criteria in the industrial design process.
3. Be able to define the physical requirements for the proposed design project.
4. Be able to relate system design requirements to specific work structure activity
5. Be able to prepare a schedule of the proposed personnel requirements in the approach.
6. Develop an overview of principles of system operations.
7. Develop an overview of available computer-aided design algorithms required for the project.
8. Be able to propose a model system design requirements for project process.
9. Be able to relate the proposed model components to implemental system level components.
10. Be able to layout, prepare and present the proposed system operations in a presentation with visual aides describing the system, final project proposal, highlighting the proposed system solution implementation.

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
	(a)	An ability to apply knowledge of mathematics, science, and engineering
	(b)	An ability to design and conduct experiments, as well as to analyze and interpret data
1-10	(c)	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
1-10	(d)	An ability to function on multidisciplinary teams
1-10	(e)	An ability to identify, formulate, and solve engineering problems
1-10	(f)	An understanding of professional and ethical responsibility
1-10	(g)	An ability to communicate effectively
1-10	(h)	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
1-10	(i)	A recognition of the need for, and an ability to engage in life-long learning
1-10	(j)	A knowledge of contemporary issues
1, 2	(k)	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 486 Service Systems Analysis
3 credits / 3 Lecture

Instructor: E. Delbert Horton, Ph.D., P.E.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Service Management: Operations, Strategy, Information Technology, James A. Fitzsimmons, 6e, McGraw-Hill Companies, ISBN – 13 9780077228491

Course Description:

This course should impart to the student the ability to visualize the engineering issues that face the service business versus similar issues in the manufacturing business. The IE student at the end of this course should be able to think from the point of view of a service business model, developing the requirements for supporting facilities, technology required in the serving business and metrics for the measure of service quality.

Course Requirement: Required

Student Learning Outcomes:

Upon satisfactory completion of the course, the student will:

1. be able understand the various roles of service in our economy.
2. be able to define and apply a service strategy
3. be able to specify requirements for both strategic and operational issues pertaining to services.
4. be current on service out-sourcing and this impacts the supply chain issues with service.
5. be able to understand and apply techniques for ensuring quality and evaluating long-term strategy planning.
6. achieve an understanding of the concept to both qualify and quantify aspects of service performance.
7. acquire an understanding to analyze various service operations.
8. achieve an understanding between conceptual and applied operations in service business.
9. be able to specify the requirements, analyze, and design balanced facility and service management system for service business, e.g. third party logistic organizations.

10. be able to develop techniques for estimating service demands and to design the service capacity to accommodate these demands.

Course Topics

1. Role of service/nature services
2. Service strategy
3. New service development
4. Technology in services
5. Service quality
6. Process improvement
7. Service encounter
8. Supporting facilities and process flow
9. Service facility location
10. Managing capacity and demand
11. Managing waiting lines
12. Managing facilitating goods

ABET ADDENDUM for IE 486

IE Course Competencies (IECCs)

1. be able understand the various roles of service in our economy.
2. be able to define and apply a service strategy
3. be able to specify requirements for both strategic and operational issues pertaining to services.
4. be current on service out-sourcing and this impacts the supply chain issues with service.
5. be able to understand and apply techniques for ensuring quality and evaluating long-term strategy planning.
6. achieve an understanding of the concept to both qualify and quantify aspects of service performance.
7. acquire an understanding to analyze various service operations.
8. achieve an understanding between conceptual and applied operations in service business.
9. be able to specify the requirements, analyze, and design balanced facility and service management system for service business, e.g. third party logistic organizations.
10. be able to develop techniques for estimating service demands and to design the service capacity to accommodate these demands.

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
7,8,9,10		(a) An ability to apply knowledge of mathematics, science, and engineering
		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
3, 9, 10		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
10		(d) An ability to function on multidisciplinary teams
3-6,9,10		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
8,9,10		(g) An ability to communicate effectively
1, 4, 9		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
2		(j) A knowledge of contemporary issues
3,6,7, 9,10		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IE 495 Industrial System Design
4 credits / 4 Lecture

Instructor: E. Delbert Horton, Ph.D., P.E.
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: The Team Handbook, 3rd, Peter R. Scholtes, Brian L. Joiner, Barbara J. Streibel, Oriel Incorporated. (ISBN 1-884731-266-0)

Reference Materials: Facilities Planning 3rd Edition, Tompkins et al, John Wiley, (ISBN 0-471-41389-5)

Facility Design: Manufacturing Engineering, S. Konz, Publishing Horizons, Inc., 2nd Edition, 1994

Manufacturing Facilities: Location, Planning, and Design, D.R. Sule, PWS Publishing Company, 2nd edition, 1994

Facility Layout and Location: An Analytical Approach, R.L. Francis and J.A. White, Prentice Hall, 1974

Methods, Standards, and Work Design, 11th edition, Benjamin Neibel and Andris Freivalds, McGraw-Hill Higher Education, ISBN 0-070246824-6

Simulation with Arena, 2nd edition, W. David Kelton, Randall P. Sadowski, Deborah A. Sadowski, McGraw-Hill, 2002, ISBN 0-07-239270-3

Introduction to Statistical Quality Control, 4th edition, Douglas C. Montgomery, John Wiley & Sons, Inc, ISBN 0-471-31648-2

Operations Research Applications and Algorithms, 3rd edition, Wayne L. Winston, Duxbury Press, ISBN 0-534-520200 includes software package.

Project Management, The Managerial Process, Fourth Edition, Clifford F. Gray, Erik W. Larson, (ISBN 978-0-07-352515) @ 2008

Engineering Cost Estimating, 3rd edition, Phillip F. Oswald, Prentice Hall, 1992, ISBN 0-13-276627-2

Course Description:

IE 471 student teams prepared a proposal (technical and management sections) to outline the approach and methodology the team plans to follow in working with industry sponsors on real-world industrial engineering process improvement activities for the IE 495 course.

Course Requirement: Required

Student Learning Outcomes:

Upon satisfactory completion of the course, the student as a industrial system designer will:

1. Apply the engineering design process and application of quantitative tools as a foundation for demonstrating the proposed approach is a valid approach for the team's industrial design project.
2. Become acquainted with the using adaptability property as criteria in the industrial design process.
3. Be able to define the physical requirements for the proposed design project.
4. Be able to relate system design requirements to specific work structure activity
5. Be able to prepare a schedule of the proposed personnel requirements in the approach.
6. Develop an overview of principles of system operations.
7. Develop an overview of available computer-aided design algorithms required for the project.
8. Be able to propose a model system design requirements for project process.
9. Be able to relate the proposed model components to implemental system level components.
10. Be able to layout, prepare and present the proposed system operations in a presentation with visual aids describing the system, final project proposal, highlighting the proposed system solution implementation.

Course Topics

Discussions with Sponsor's Managers for Requirement

System Requirements Review with Sponsor

Project Design April 14, 2011

Project Final Design Report and Presentation

ABET ADDENDUM for IE 495

IE Course Competencies (IECCs)

1. Apply the engineering design process and application of quantitative tools as a foundation for demonstrating the proposed approach is a valid approach for the team's industrial design project.
2. Become acquainted with the using adaptability property as criteria in the industrial design process.
3. Be able to define the physical requirements for the proposed design project.
4. Be able to relate system design requirements to specific work structure activity
5. Be able to prepare a schedule of the proposed personnel requirements in the approach.
6. Develop an overview of principles of system operations.
7. Develop an overview of available computer-aided design algorithms required for the project.
8. Be able to propose a model system design requirements for project process.
9. Be able to relate the proposed model components to implemental system level components.
10. Be able to layout, prepare and present the proposed system operations in a presentation with visual aids describing the system, final project proposal, highlighting the proposed system solution implementation

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
1, 2		(a) An ability to apply knowledge of mathematics, science, and engineering
		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
1-10		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
1-10		(d) An ability to function on multidisciplinary teams
8, 9		(e) An ability to identify, formulate, and solve engineering problems
1-10		(f) An understanding of professional and ethical responsibility
1-10		(g) An ability to communicate effectively
1-10		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
1-10		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
7		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IT 111 Computer – Aided Design
3 credits / 2 Lecture – 2 Lab

Instructor: Larry H. Walker, P.E., PMP, Adjunct Professor
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Tutorial Guide to AutoCAD 2008, A Shawna Lockhart, Montana State ISBN-10: 0136127215, ISBN-13: 9780136127215, Publisher: Prentice Hall, Copyright 2008, Format: Paper; 672 pp, Published: 09/19/2007

Course Description

This is an introductory course in freehand sketching and computer-aided drafting/ design. Students will be taught basic CAD commands, tools, multi-view drawing and dimensioning techniques. For successful completion of this course a comprehensive examination over the use and execution of CAD will be required. Persons not passing the comprehensive examination will be required to repeat the course.

Course Requirement: Required

Student Learning Outcomes:

1. Demonstrate basic concepts of the AutoCAD software
2. Apply basic concepts to develop construction (drawing) techniques
3. Ability to manipulate drawings through editing and plotting techniques
4. Understand geometric construction
5. Produce template drawings
6. Produce 2D Orthographic Projections
7. Understand and demonstrate dimensioning concepts and techniques
8. Understand Section and Auxiliary Views
9. Become familiar with the use of Blocks, Design Center, and Tool Palettes
10. Become familiar with Solid Modeling concepts and techniques.

Course Topics

1. Basic concepts of AutoCAD
2. Intermediate concepts of AutoCAD
3. 3D modeling with AutoCAD
4. Tutorials
 - Tutorial 1
 - Tutorial 2
 - Tutorial 3
 - Tutorial 4
 - Tutorial 5
 - Tutorial 6
 - Tutorial 8
5. Drawing exercises
 - Exercises 1.1, 1.2, 1.4, 1.5M, 1.6, 1.7M, 1.9, and 1.11
 - Exercises 2.1M, 2.2, 2.3M, 2.5, 2.6, and 2.10M
 - Exercises 3.1, 3.3, 3.4, 3.5, 3.7, and 3.8
 - Exercises 4.1M, 4.5, 4.6, and 4.8M
 - Exercises 5.2 and 5.3
 - Exercises 6.1, 6.2, 6.3M, 6.4M, 6.5, 6.9M, 6.11M, and 6.12
 - Exercises 8.4 and 8.8

ABET ADDENDUM for IT 111

STUDENT OUTCOMES/OBJECTIVES

1. Demonstrate basic concepts of the AutoCAD software
2. Apply basic concepts to develop construction (drawing) techniques
3. Ability to manipulate drawings through editing and plotting techniques
4. Understand geometric construction
5. Produce template drawings
6. Produce 2D Orthographic Projections
7. Understand and demonstrate dimensioning concepts and techniques
8. Understand Section and Auxiliary Views
9. Become familiar with the use of Blocks, Design Center, and Tool Palettes
10. Become familiar with Solid Modeling concepts and techniques.

Relationship to IEPOs (a-k Outcomes) and IECCs

IECCs	IEPOs	
2,3,4,6,7		(a) An ability to apply knowledge of mathematics, science, and engineering
		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		(d) An ability to function on multidisciplinary teams
8		(e) An ability to identify, formulate, and solve engineering problems
		(f) An understanding of professional and ethical responsibility
5,6,9		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
1,10		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IT 112 Product Design & Development
3 credits / 2 Lecture – 2 Lab

Instructor: Dr. Brent Donham, Department Head & Associate Professor
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Planchard, D. C. and Planchard, M. P., (2010). *Engineering design with SolidWorks 2010: A step-by-step project based approach utilizing 3D solid modeling*, Schroff Development Corporation, Mission, Kansas. ISBN 978-1-58503-572-4.

Required Materials: 1) Bound notebook, such as a composition notebook (Available at the A&M-Commerce bookstore or any office supply store) 2) Scientific calculator 3) Memory stick or portable storage device

Reference Materials: SolidWorks Student Design Kit (License available through textbook)

Course Description

Product development and design processes and methods, including product specifications, concept development, engineering drawings, design for prototyping, and manufacturing. Prerequisite IT 111 or the equivalent

Course Requirement: Required

Student Learning Outcomes:

Upon satisfactory completion of the course, the student will be able to:

1. Describe an engineering design and development process
2. Create 3D solid models of mechanical components using CAD software
3. Demonstrate individual skill using selected manufacturing techniques, including drilling, pressing, tapping, and rapid prototyping
4. Employ engineering, scientific, and mathematical principles to execute a design from concept to finished product
5. Fabricate an electromechanical assembly from engineering drawings
6. Work collaboratively on a team to successfully complete a design project
7. Effectively communicate the results of projects and other assignments in a written and oral format

Course Topics

Units of Study

Module 1

- Introduction to product design and development
- Fundamentals of 3D modeling
- Basic manufacturing processes

Module 2

- Engineering design
- Proof of concept
- Rapid prototyping

Module 3

- Assembly model
- Assembly drawing
- Manufacturing process plan
- Electromechanical assembly
- Test and troubleshoot electromechanical system

ABET ADDENDUM for IT 112

STUDENT OUTCOMES/OBJECTIVES

1. Describe an engineering design and development process
2. Create 3D solid models of mechanical components using CAD software
3. Demonstrate individual skill using selected manufacturing techniques, including drilling, pressing, tapping, and rapid prototyping
4. Employ engineering, scientific, and mathematical principles to execute a design from concept to finished product
5. Fabricate an electromechanical assembly from engineering drawings
6. Work collaboratively on a team to successfully complete a design project
7. Effectively communicate the results of projects and other assignments in a written and oral format

Relationship to IEPOs (a-k Outcomes) and IECCs

IECCs	IEPOs	
2,3,4		(a) An ability to apply knowledge of mathematics, science, and engineering
4,5		(b) An ability to design and conduct experiments, as well as to analyze and interpret data
1,2,4,5		(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
6		(d) An ability to function on multidisciplinary teams
4,5		(e) An ability to identify, formulate, and solve engineering problems
6		(f) An understanding of professional and ethical responsibility
1,6,7		(g) An ability to communicate effectively
		(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
		(i) A recognition of the need for, and an ability to engage in life-long learning
		(j) A knowledge of contemporary issues
1,2,3,4,5		(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



IT 340 Quality Management and Improvements
3 credits / 3 Lecture

Instructor: Sukwon Kim, Ph.D., Assistant Professor in IET
Department of Engineering & Technology

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Quality Management, 2/E Donna C.S. Summers ISBN-10:
0135005108 ISBN-13: 9780135005101 Publisher: Prentice Hall

Course Description .

Students will explore how quality management has progressed from an emphasis on the management of quality to a focus on the quality of managing, operating, and integrating customer service, marketing, production, delivery, information, and finance areas throughout an organization's value chain. Chapters on lean, Six Sigma, ISO 9000, and supply chain management cover the latest areas that are critical to companies competing in today's global environment. Designed to enable students to recognize the cornerstones of creating and sustaining organizational effectiveness, this course is based on key quality initiatives, including Six Sigma, the Malcolm Baldrige National Quality Award, ISO 9000, lean manufacturing, and value creation.

Course Requirement: Selected Elective

Student Learning Outcomes:

By the conclusion of this course the students will be able to:

1. Define the term Total Quality Management (TQM) and related terms.
2. Explain the history of the Quality Movement and how it applies to different types of businesses and organizations.
3. Develop and improve problem solving skills and apply them to quality issues and problems.
4. Understand and apply the basic tools of TQM to everyday business problems and practices.
5. Demonstrate the ability to work as part of a team.
6. Discuss the guidelines for implementing TQM and managing change in work organizations.
7. Talk about ethical issues as related to quality of services and products.
8. Present the international and cultural elements of TQM.

Course Topics

1. Organizational effectiveness
2. Organizational philosophy
3. Quality systems
4. Creating a customer focus
5. Organizational leadership
6. Strategic planning
7. Human resource development and management
8. Managing the supply chain
9. Measures of organizational success
10. Benchmarking
11. Process management

ABET ADDENDUM for IT 340

IE Course Competencies (IECCs)

1. Define the term Total Quality Management (TQM) and related terms.
2. Explain the history of the Quality Movement and how it applies to different types of businesses and organizations.
3. Develop and improve problem solving skills and apply them to quality issues and problems.
4. Understand and apply the basic tools of TQM to everyday business problems and practices.
5. Demonstrate the ability to work as part of a team.
6. Discuss the guidelines for implementing TQM and managing change in work organizations.
7. Talk about ethical issues as related to quality of services and products.
8. Present the international and cultural elements of TQM

Relationship of Student Outcomes (a-k) to IECCs

IECCs	IE Student Outcomes	
	(a)	An ability to apply knowledge of mathematics, science, and engineering
	(b)	An ability to design and conduct experiments, as well as to analyze and interpret data
	(c)	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
5	(d)	An ability to function on multidisciplinary teams
	(e)	An ability to identify, formulate, and solve engineering problems
7	(f)	An understanding of professional and ethical responsibility
6	(g)	An ability to communicate effectively
2, 6	(h)	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
	(i)	A recognition of the need for, and an ability to engage in life-long learning
1-8	(j)	A knowledge of contemporary issues
	(k)	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice



Chem 1411 General and Quantitative Chemistry
4 credits / 3 Lecture – 4 Lab

Instructor: Dr. Laurence Angel
Chemistry Department

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: **General Chemistry**, 9th Edition, Ebbing, Gammon, Houghton Mifflin Company, New York, NY, copyright 2009.

Experiments in General Chemistry, 9th Edition, by R.A.D. Wentworth, published by Houghton Mifflin Company, New York, NY.

Required Materials: A pair of safety goggles, padlock, calculator, and periodic table

Reference Materials:

Course Description:

This is the first part of a two-course sequence of general chemistry. The course is designed primarily for students majoring in sciences or in pre-professional programs. By the end of the course, students will be familiar with the concepts of atomic and molecular structure, chemical formulas, reactions, equations, thermochemistry, quantum theory, electron configurations, periodicity, chemical bonding, and reactions of gases, liquids and solids. Chemists deal with these topics every day, but these concepts are also crucially important to other branches of science.

Course Requirement: Required

Student Learning Outcomes:

By the end of the course, students will be familiar with:

1. concepts of atomic and molecular structure
2. chemical formulas
3. reactions, equations
4. thermochemistry
5. quantum theory
6. electron configurations

7. periodicity
8. chemical bonding
9. reactions of gases, liquids and solids

Course Topics

1. Atomic and molecular structure
2. Chemical equations and formulas
3. Chemical reactions
4. Gaseous State
5. Thermochemistry
6. Quantum theory
7. Electron configurations
8. Periodicity
9. Ionic and covalent bonding
10. Molecular geometry and Bonding Theory
11. Liquid and solids

Laboratory Topics

1. Lab safety
2. Mass and volume measurements
3. Identification of an unknown compound
4. Isotopes and mass spectrometry
5. Empirical formula of an Oxide
6. Hydrates and their thermal decompositions
7. Ionic reactions in aqueous solutions
8. Boyle's Law and empty space in air
9. Decomposition of Potassium Chlorate
10. Thermochemistry and Hess's Law
11. Absorption spectrum of Cobalt(II) Chloride
12. Solubility within a family
13. Identify of an insoluble precipitate
14. Geometric isomers



Chem 1411 General and Quantitative Chemistry
4 credits / 3 Lecture – 4 Lab

Instructor: Dr. Stephen Starnes
Chemistry Department

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: **General Chemistry**, 9th Edition, Ebbing, Gammon, Houghton Mifflin Company, New York, NY, copyright 2005.

Experiments in General Chemistry, 9th Edition, by R.A.D. Wentworth, published by Houghton Mifflin Company, New York, NY.

Required Materials: A pair of safety goggles and a padlock

Reference Materials:

Course Description:

This is the first part of a two-course sequence of general chemistry. This course is designed primarily for the students majoring in sciences or in pre-professional programs. Topics covered include the scientific method; characteristics and transformations of matter, including atomic theory, chemical reactions, and the behavior of gases; an introduction to energy; and bonding and shapes of molecules.

Course Requirement: Required

Student Learning Outcomes:

Course Topics

1. Scientific method
2. Characterization and transformation of matter
3. Atomic theory
4. Chemical reactions
5. Behavior of gases
6. Introduction to energy
7. Bonding and shaping of molecules



CSCI 151 Programming Fundamentals I
3 credits / 3 Lecture

Instructor: Thomas L. Brown
Computer Science Department

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required:

Required Materials:

Reference Materials: Malik, D.S. C++ Programming 2nd (or later) Edition. Boston: Thompson Course Technology, 2007. (ISBN 1-4188-3639-9).
Dev C++ Compiler available in the CSci labs and as a freeware download from <http://www.bloodshed.net>
Scratch software is a free download from <http://scratch.mit.edu/>

Course Description:

This is a lecture and laboratory course offered to introduce the fundamental concepts of computer science and programming. Topics include software development methodology, algorithm design, data types, control structures, functions, arrays, structures (records), files, classes and objects, and the mechanics of testing and verifying program correctness.

Course Requirement: Required

Student Learning Outcomes:

1. Become familiar with computer hardware and software terminology.
2. Understand the basic elements of a computer program including documentation techniques and the declaration of identifiers.
3. Edit, translate and execute a computer program.
4. Write a program to input data from the keyboard and output to the display screen for computations and other processing.
5. Apply control structures to alter the sequential flow of execution of program statements including selection and repetition control structures.
6. Create user-defined functions, develop programs consisting of multiple functions, master function parameter passing, and the scope and lifetime of an identifier.

7. Define and manipulate one-dimensional arrays.
8. Declare and process structures used for organizing data.
9. Access data stored on external files.
10. Apply software development methodology to effectively design, test and debug computer programs.

Course Topics

1. Computer hardware and software terminology
2. Basic elements of computer programming
3. Documentation
4. Edit, translate, and execute a computer program
5. Control structures
6. User defined functions
7. Arrays
8. Data organization



Economics 2301 Principles of Macro Economics
3 credits / 3 Lecture

Instructor: Asli K. Ogunc
Department of Accounting Economics & Finance

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Principles of Economics (Brief Edition) - ISBN 978-0-07-337587-8 by Robert H. Frank & Ben S. Bernanke - McGraw-Hill Irwin

OR

Principles of Macroeconomics (Brief Edition) - ISBN 978-0-07-723182-8 by Robert H. Frank & Ben S. Bernanke - McGraw-Hill Irwin

Course Description:

The objective of this class is to provide the student with an introduction to the economic way of thinking as well as an understanding of the role that markets and prices play in the world economy. Particular emphasis will be given to the application of macroeconomic theory to contemporary policy issues such as unemployment, inflation, growth, the federal budget, social security, global competition, as well as the economic and social implications of core macroeconomic concepts.

Course Requirement: Selected Elective

Student Learning Outcomes:

Course Topics

1. Chapter 1 Thinking Like an Economist
2. Chapter 2 Comparative Advantage
3. Chapter 3 Supply and Demand
4. Chapter 4(12) Spending, Income, and GDP
5. Chapter 5(13) Inflation and Price Level
6. Chapter 6(14) Wages and Unemployment
7. Chapter 7(15) Economic Growth
8. Chapter 8(16) Savings, Capital Formation, and Financial Markets
9. Chapter 9(17) The Financial System, Money, and Prices

10. Chapter 10(18) Short-Term Fluctuations
11. Chapter 11(19) Spending and Output in the Short Run
12. Chapter 12(20) Stabilizing the Economy: The Role of Federal Reserve
13. Chapter 13(21) Aggregate Demand and Aggregate Supply and Macroeconomic Policy
14. Chapter 14(22) Exchange Rates, International Trade, and Capital Flows



Economics 2301 Principles of Macro Economics
3 credits / 3 Lecture

Instructor: Maryfrances Miller, Professor of Economics
Department of Accounting Economics & Finance

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Principles of Economics (Brief Edition) ISBN 978-0-07-337587-8,
Robert H. Frank & Ben S. Bernanke, Published by McGraw-Hill Irwin

Course Description:

Introduces the student to the workings and interrelationships of the U.S. and world economics. Principles of economic analysis including measurement of aggregate economic activity, national income determination, money and banking, monetary and fiscal policy, and business fluctuation. Emphasis is given to analyzing real world problems such as poverty, inflation, unemployment, and economic instability

Course Requirement: Selected Elective

Student Learning Outcomes:

Upon satisfactory completion of the course, the student will:

1. Understand and apply the concept of scarcity
2. Understand and apply the concept of opportunity cost
3. Be able to interpret production possibilities frontier
4. Be able to apply the concept of demand and supply to markets and prices.
5. Be able to understand and calculate GDP.
6. Be able to understand and calculate unemployment
7. Understand fiscal policy and its impact within the framework of the AD/AS model.
8. Understand the causes and deterrents of economic growth.
9. Understand the impact of Monetary Policy on the price level.

Course Topics

1. Concept of scarcity
2. Concept of opportunity cost
3. Production possibilities frontier
4. Concept of demand and supply to markets and prices.

5. GDP.
6. unemployment
7. Fiscal policy and its impact within the framework of the AD/AS model.
8. Causes and deterrents of economic growth.
9. Impact of Monetary Policy on the price level.



Economics 2302 Principals of Micro Economics
3 credits / 3 Lecture

Instructor: Frannie Millier, Professor of Economics
Department of Accounting Economics & Finance

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Required Text(s): Principles of Economics (Brief Edition) ISBN 978-0-07-337587-8,
Robert H. Frank & Ben S. Bernanke. Published by McGraw-Hill Irwin

Required Materials:

Reference Materials:

Course Description:

Introduces the student to the basic concepts and tools of analysis in microeconomics. Focuses on the operation of markets, with emphasis placed on the analysis of current problems such as health care, the environment, crime, education and regulatory reform. A major concern is how prices of individual goods and services are determined and how prices influence decision making.

Course Requirement: Selected Elective

Student Learning Outcomes:

Upon satisfactory completion of the course, the student will:

1. Understand how economics differs from the other social sciences.
2. Understand what a PPF is and how it helps us to understand the issue of choice.
3. Understand the role of utility maximization in choice.
4. Understand that consumer choice represents constrained maximization.
5. Understand the difference between demand and quantity demanded.
6. Understand the economic concept of the market clearing price.
7. Understand the relationship between inputs and outputs.
8. Be able to identify the four market types and three aspects of each type.
9. Understand the role of profit maximization.
10. Understand how wages are determined.

Course Topics

1. Difference between economics and the other social sciences.
2. PPF
3. Utility maximization in choice.
4. Consumer choice represents constrained maximization.
5. Difference between demand and quantity demanded.
6. Market clearing price.
7. Relationship between inputs and outputs.
8. Market types
9. Profit maximization.
10. Wages.



Math 192_001 Calculus II
4 credits / 4 Lecture

Instructor: Dr. Bill Aslan
Department of Mathematics

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Calculus, Sixth Edition, James Stewart. Thomson-Brooks/Cole, 2008.

Required Materials: TI-83 graphing calculator

Course Description:

This course examines differential and integral calculus of functions of one variable, as follows. Topics include limits; continuity; derivatives; curve sketching; applications of the derivative; the definite integral; derivatives and integrals of the logarithmic, exponential, and trigonometric functions; and use of computer technology.

Course Requirement: Required

Student Learning Outcomes:

In addition to learning mathematics, goals of the course also include developing a comfort level in technology, learning to efficiently work together with other people, and gaining skills in communicating technical ideas in written form

Course Topics

1. Limits
2. Derivative of functions (linear, quadratic, polynomial, rational, exponential, logarithmic)
3. Graphing
4. Optimization
5. Integration and their applications



Math 192 Calculus II
4 credits / 4 Lecture

Instructor: Dr. Donald Fausett
Department of Mathematics

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Calculus, Sixth Edition, James Stewart

Course Description:

Exponential, logarithmic, and inverse trigonometric functions; techniques of integration; applications of integration; improper integrals; parametric equations and polar coordinates; and infinite sequences and series.

Course Requirement: Required

Student Learning Outcomes:

Course Topics

1. Exponential functions and their derivatives
2. Exponential growth and decay
3. Indeterminate forms
4. Trigonometric integrals
5. Strategy for integration
6. Improper integrals
7. Area of surface of revolution
8. Probability
9. Polar coordinates
10. Conic sections in polar coordinates
11. Series
12. Alternating series
13. Power series
14. Taylor polynomial applications



Math 315 Differential Equations
3 credits / 3 Lecture

Instructor: Dr. Nikolay Metodiev Sirakov
Department of Mathematics

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Elementary DE and Boundary Value Problems, 9th Edition, by Williams E. Boyce & Richard C. DiPrima, 2009 John Wiley, ISBN: 978-0-470-38334-6

Course Description:

First order equations, second order linear equations, power series solutions, Laplace Transforms, and applications.

Course Requirement: Required

Student Learning Outcomes:

1. To introduce students to the theory of the ordinary differential equations.
2. To help students develop competitive reasoning and skills in working and solving First and Higher order linear Ordinary DE
3. First Order Linear systems of Ordinary DE
4. Series solutions near an ordinary point
5. Laplace transforms.

Course Topics

1. Chapter 1
2. Chapter 2
3. Chapter 3.1 - 3.6
4. Chapter 4
5. Chapter5: 5.1-5.3
6. Section 6.1
7. Chapter7: 7.1-7-5.



Math 335 Linear Algebra
3 credits / 3 Lecture

Instructor: Dr. Nikolay Metodiev Sirakov
Department of Mathematics

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Textbook(s) Required: Linear Algebra and its Applications, 3rd edition, by David C. Lay

Course Description:

Vector spaces; linear transformations; matrices; determinants; systems of linear equations; equivalence relations on matrices; characteristic vectors; operators. Prerequisite Math 331.

Course Requirement: Required

Student Learning Outcomes:

To introduce to the students the theory and techniques of:

1. linear equations
2. matrix algebra
3. Vector Spaces
4. Linearly independent sets, bases
5. Eigenvalues and Eigenvectors

Course Topics

1. Chapter 1-except 1.10
2. Chapter 2 – 2.1-2.3, 2.8, 2.9
3. Chapter 4: 4.1-4.7
4. Chapter 5: 5.1-5.4
5. Chapter 6: 6.1-6.4



Physics 2425 University Physics I
4 Credits / 3 Lecture – 3 Lab

Instructor: Dr. Charles Rogers
Physics and Astronomy Department

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Required Text(s): Fundamentals of Physics by Halliday, Resnick, & Walker

Required Materials: Physics 211(2425) Lab Manual

Course Description:

Calculus based physics course in mechanics for science, mathematics and engineering students.
Prerequisite Math 2413 or consent of instructor.

Course Requirement: Required

Student Learning Outcomes:

1. Students learn the fundamental principles and physical concepts of physical mechanics.
2. The laboratory emphasizes data collection and analysis for experiments covering these principles and concepts

Course Topics

1. Mechanics for science



Physics 2426 University Physics II
4 Credits / 3 Lecture – 3 Lab

Instructor: Dr. Carlos A. Bertulani
Physics and Astronomy Department

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings:

Required Text(s): Fundamentals of Physics, Part 3 (Chapters 21-32), David Halliday, Robert Resnick, Jearl Walker (Authors). Publisher: Wiley; 9th edition, 2011. ISBN-10: 978-0-470-46908-8

Required Materials: A scientific calculator with sin, cos, tan, exp, log, and roots, as well as the inverse operations.

Course Description:

A calculus based physics course on electromagnetism for science, mathematics and engineering students.

Course Requirement: Required

Student Learning Outcomes:

The student will learn electricity and magnetism with a calculus based method.

Course Topics

1. Magnetism
2. Electricity

Appendix B – Faculty Vitae

Current curriculum vitae are provided for the individuals listed in Table 6-1, Faculty Qualifications.

Department Head

- Brent Donham

Industrial Engineering Faculty

- Pelin Altintas-Deleon (Spring 2011 appointment)
- Matthew Elam
- Delbert Horton
- Sukwon Kim (resigned Spring 2011)

Adjunct Instructors (required freshman-level industrial technology courses)

- Perry Moler
- Larry Walker

BRENT L. DONHAM

Department Head and Associate Professor

EDUCATION:

Ed.D., Educational Administration. Texas A&M University – Commerce, 2005

M.S., Electrical Engineering. Stanford University, 1984

B.S., Electrical Engineering. New Mexico State University, 1983

ACADEMIC EXPERIENCE:

Texas A&M University-Commerce: Department Head & Associate Professor (tenure-track).
January 2009-present (full-time)

Richland College: Associate Vice President, Engineering & Technology / Educational
Transitions. September 2008-December 2008 (full-time)

Richland College: Executive Dean, School of Engineering & Technology.
September 2005-August 2008 (full-time, teaching was part of load)

Richland College: Dean of Instruction, Engineering Technology & Emerging Programs.
September 2000-August 2005 (full-time, teaching was part of load)

Richland College: Associate Dean, Technology Programs. September 1998-August 2000
(full-time, teaching was part of load)

Richland College: Teaching Administrator. August 1996-August 1998 (full-time, teaching
was part of load)

INDUSTRY EXPERIENCE:

E-Systems/Raytheon: Senior Engineering Specialist. DARPA sponsored Multichip Module
(MCM) research program | international avionics system integration program.
June 1990-August 1996 (full-time)

Sandia National Laboratories: Member of Technical Staff. Thick film hybrid designer |
integrated circuit designer. May 1983-May 1990 (full-time)

PROFESSIONAL SOCIETIES:

American Society for Engineering Education (ASEE), Member

Phi Delta Kappa International (PDK), Member

Metroplex Technology Business Council (MTBC), Institutional Representative

SELECTED HONORS AND AWARDS:

Texas A&M System Teaching Excellence Award, Spring 2010 | Faculty Paper Award,
American Society for Engineering Education-Gulf Southwest Conference, 2009 | Morphet
Dissertation Award, National Council of Professors of Educational Administration, 2006 |
Tech Titan of the Future Award, Metroplex Technology Business Council, 2005 |
President's Award for Excellence, Texas Association of College Technical Educators, 2002 |
Top 100 Award for Technical Achievement, E-Systems, 1992.

SELECTED INSTITUTIONAL SERVICE ACTIVITIES:

College of Science, Engineering, & Agriculture Dean Search Committee. 2011 appointment | *IT Visioning Task Force.* Committee charged with developing a RFQ for a Technology Visioning Consultant. 2010 appointment | *Academic College Expansion Task Force.* Committee charged with investigating the feasibility and viability of establishing a 4th academic college at A&M-Commerce. 2010 appointment | *Research & Creative Activities Administrative Committee:* Recommending body for funding internal research proposals 2009-present appointment | *College of Business & Technology Strategic Planning Committee:* Committee charged with establishing strategic goals and objectives for the college. 2009-2011 appointment | *Lion's Pride BEST Robotics Hub Director:* A non-profit high school and middle school robotics association. 2010-present.

SELECTED COMMUNITY SERVICE ACTIVITIES:

North Central Texas InterLink Board of Directors: Alliance charged to develop workforce information for North Central Texas. 2010-present | *Regional Advisory Boards:* Richland College, Paris Junior College, and NorthEast Texas Career and Technical Consortium. 2009-present | *Rockwall Independent School District Strategic Planning Committee:* 2008, 2010.

SELECTED PUBLICATIONS

Donham, B. L. (2011). Impact of engineering summer camps on rural students. *Proceedings of the 2011 American Society for Engineering Education Gulf-Southwest Conference.*

Donham, B. L., & Elam, M. (2010). Promoting interest in engineering in rural school districts through summer camps. *Proceedings of the 2010 American Society for Engineering Education Gulf-Southwest Conference.*

Donham, B. L. (2009). Articulated Associate in Science engineering degree. *Proceedings of the 2009 American Society for Engineering Education Gulf-Southwest Conference.*

Six referred conference or invited presentations since the A&M-Commerce appointment in 2009. Three journal articles and thirteen professional conference presentations prior to the appointment at A&M-Commerce. Additional details are provided upon request

SELECTED GRANTS & SPONSORED PROJECTS

Engineering Recruitment Program – Engineering Summer Programs, Texas Higher Education Coordinating Board. Engineering summer camps. Author, project leader. 2011/2010/2009 | *Texas Youth in Technology,* Texas Workforce Commission. Early engineering intervention program. Co-Author, former project leader | *Dallas STEM Gateways Collaborative,* National Science Foundation. Joint recruitment/retention initiative between the University of Texas at Dallas, Collin County Community College, and Richland College Co-author, former Co-PI.

PROFESSIONAL DEVELOPMENT

ASEE Annual Gulf-Southwest Conference, 2009-2011 | *Texas Engineering Experiment Station (TEES) Grant Workshop,* 2011 | *L-3 Communications Research Presentations,* 2011 | *TEXO (Construction Engr/Mgt) Educators Conference,* 2010 | *Texas Engineering Deans Annual Summit,* 2010 | *ABET Commission Summit,* 2009 |

PELIN ALTINTAS-DELEON, Ph.D.

Assistant Professor

Education

Texas Tech University, Lubbock, TX

Ph.D. in Systems and Engineering Management/Industrial Engineering, 2010

Texas Tech University, Lubbock, TX

M.S. in Industrial Engineering, 2003

Dokuz Eylul University, Izmir, Turkey

B.S. in Industrial Engineering, 1998

Professional Experience

Texas A&M University-Commerce-Industrial Engineering and Technology Department Feb. 2011-May 2011

- Ad-Interim Assistant Professor (Full-time tenure track appointment, September 1, 2011)
- Teaching: Engineering Economic Analysis, Facilities Planning & Management, Manufacturing Systems Design and Control.

TTU-Fiber Biopolymer Research Institute 2002-2011

- Running experiments, collecting and analyzing data, writing journal articles and conference papers.
- Assisted on the process of Lab-Spinning machine update (updating operating system to visual basic programming).

TTU-Industrial Engineering Department 2004-2007

- Assisted grant proposals, projects (cost of quality analysis of fiber to fabric system, economical analysis of a fuel pellet manufacturing operation, site assessment for rural transit regional maintenance center), writing reports, proposals, conference papers, and journal articles.
- Grading homework, taught lectures when needed on Economics of Engineering Management.

Aydinel Tekstil (Apparel Manufacturing Plant in Turkey) 1999-2000

- Assembly line balancing. Production scheduling and control. Process flow diagrams.

Roteks Tekstil (Apparel Manufacturing Plant in Turkey) 1998

- Assembly line balancing. Time studies. Production and capacity planning. Load schedules. Process flow diagrams. Project scheduling-CPM.

RAKS (House Appliances Manufacturing Plant in Turkey) 1996 (Summer Intern)

- Assisted at the Production Planning Department; preparing daily production forecasts and quality control charts.

OPEL (German Automobile Manufacturing Plant in Turkey) 1995 (Summer Intern)

- Analyzing the production system (JIT/KANBAN); preparing process flow diagrams and reports on performance measurements, inventory management (MRP-I), quality control, and resource planning (MRP-II).

Publications

- “The Concept of a Regional Maintenance Center,” *Journal of Public Transportation*, vol. 12, no. 3, 2009, pp. 105-118. (M.G. Beruvides, J.L. Simonton, N.M. Waters, E.H. Ng, S. Chaivichitmalakul, C.C. Chiu-Wei, P.Z. Altintas, P.T. Nash, P. Monn).
- “A New Approach to Measuring Cotton Spinnability Limits,” Accepted for publication in *Proceedings of the Beltwide Cotton Conferences*, CD-ROM, National Cotton Council of America, Nashville, 2008, 7p. (Altintas, P.Z., M. Krifa, and M.G. Beruvides).
- “Cost of Quality Analysis of Cotton Fiber to Fabric Systems,” *ASEM Annual Conference Proceedings*, CD-ROM, Nashville, TN, 2007, (P. Altintas, M.G. Beruvides and J.L. Simonton).
- “Pilot Study to Examine the Relationship between AFIS Fiber Properties and White Speck Occurrence,” *Journal of Cotton Science*, 11:3 110-118, 2007 (P.Z. Altintas, J.L. Simonton, M.G. Beruvides).
- “Preliminary study examining a systemic approach to recycling water and biomass for rural economic development,” *ICASALS Conference Proceedings*, CD-ROM, Lubbock, Texas, 2006, (J.L. Hanson, P.Z. Altintas, L.A. Barroso, M.G. Beruvides, C.B. Fedler, and J.L. Simonton).
- “Expert and Novice Operator Comparison with Scanner-based Image Analysis for White Speck Detection on Dyed Yarn,” *Journal of Cotton Science*, 9:215-222, 2005 (J.L. Simonton, M.G. Beruvides, P.Z. Altintas, and K. Kang).
- “Multi-Scenario Case Study of a Fuel Pellet Manufacturing Operation Utilizing Cotton Waste,” *Proceedings of the Beltwide Cotton Conference*, 2004 (G. Holt, J.L. Simonton, A. Canto, D. Chui, P. Altintas, A.S. Sandoval, and M.G. Beruvides).
- “Effect of Textile Treatments on White Speck Counts in Dyed Yarns,” *Proceedings of the Beltwide Cotton Conference*, 2003 (J.L. Simonton, M.G. Beruvides, P.Z. Altintas, and K. Kang).

Professional Membership and Honors

- Toastmaster International
- TTU Student Government Association (2007)
- Alpha Pi Mu (Industrial Engineering Honor Society)
- Tau Beta Pi (Engineering Honor Society)

Name: Matthew E. Elam, Ph.D., ASQ CQE

Education: Ph.D. (2001) in Industrial Engineering and Management, Oklahoma State University | B.S. (1991) and M.S. (1994) in Mathematics, The University of Texas at Tyler

Academic Experience:

2007-Current: Associate Professor of Industrial Engineering, Department of Industrial Engineering and Technology, Texas A&M University-Commerce (TAMUC); Senior Member of the Graduate Faculty

2001-2007, Assistant Professor, Department of Industrial Engineering, The University of Alabama; Second appointment to the Graduate Faculty of the Applied Statistics Program
1996-2001, Graduate Teaching Assistant, Oklahoma State University (OSU), Stillwater, OK
1995-1996, Mathematics Instructor: Austin Community College, Austin, TX
1994-1995, Mathematics Instructor: East Texas Baptist University, Marshall, TX
1993-1994, Developmental Mathematics Lab Coordinator, Kilgore College, Kilgore, TX

Consulting: Precision Components, Owasso, OK | Phillips Driscopipe, Pryor, OK | Honda Manufacturing of Alabama, LLC, Lincoln, AL | Abbott Laboratories, Abbott Park, IL | Shaw Industries, Inc., Dalton, GA

Certification: American Society for Quality (ASQ) Certified Quality Engineer (CQE)

Current membership in professional organizations: Senior Member of the Institute of Industrial Engineers (IIE) and the American Society for Quality (ASQ)

Honors and awards:

Teaching: Recipient and Finalist for the INFORMS outstanding Teaching Assistant award at OSU | Recipient of the INFORMS Award of Recognition for continued excellence as a Teaching Assistant at OSU | Recipient of two top 5% Texas A&M University System Faculty Teaching Excellence Awards | Recipient of a TAMUC College of Business and Technology Teaching Excellence Award

Research: Nominated for the Graduate Research Excellence Award at OSU | Recipient of two Research Awards at International Academy of Business and Public Administration Disciplines Conferences | Recipient of a best paper nomination at an American Society for Engineering Education Annual Conference | Recipient of a TAMUC College of Business and Technology Research Excellence Award

Education: Selected to the President's Honor Roll at UT-Tyler for two semesters | Member of Alpha Chi National College Honor Scholarship Society | Graduated Magna Cum Laude at UT-Tyler | Finalist within the School of Industrial Engineering and Management at OSU for nomination for the Phoenix Award | Member of Alpha Pi Mu (the Honor Society for Industrial Engineers) | Recipient of the Miller Distinguished Graduate Fellowship at OSU for six semesters | Member of Tau Beta Pi (Engineering Honor Society)

Who's Who: Engineering Academia and Business Higher Education (both Academic Keys) | America, Science and Engineering, and World (all Marquis) | Executives, Professionals, and Entrepreneurs (Cambridge)

Professional service at TAMUC: Undergraduate student advisor for IE | Administered IE curriculum changes | Developed three minors in IE | License Coordinator for the Minitab and Arena software packages | Consultant for Senior Design projects | Reviewed and updated the 2008-2009 IE course inventory on file at the Texas Higher Education Coordinating Board (THECB) | Assisted in the development of the IE portion of the teaching schedules | Reviewed the IE online degree guide and documented corrections and updates | Co-Founded and Co-Direct the Engineering and Statistics Tutoring Lab (ESTL) | Attended and rated student project presentations in IE 313 | Assisted/participated in the search/interviewing for/of a temporary IE faculty to teach IE 305, IE 316, and IE 207 | Reviewed the IE portion of the 2007 Undergraduate Catalog implementation of Banner and documented corrections for the new online degree evaluation system Degree Works | Graduate Council Representative for Master's and Ph.D. students during their defense process | Co-Founded and Co-Direct the Industrial Engineering Systems Engineering Laboratory (IESEL) | Thesis Advisor for an Undergraduate IE Honors Student | Served on thirteen different Department, College, and University Committees | Faculty Advisor for the IE Student Organizations IIE, Alpha Pi Mu, and ASQ | Established and administrate a mentoring program between new and current IE students | Established facebook accounts for IE Student Organizations | Regularly contact and meet with students interested in IE | Represented IE and IIE at TAMUC recruiting events | Developed course transfer agreements with community colleges | Presented IE at TAMUC at community colleges | Contributed to the development of procedures and criteria for the \$50,000 IE Recruitment Scholarship | Directed IE Student Organizations to participate in TAMUC recruiting events | Participated in ABET activities | Web site Coordinator | Administered the THECB's Engineering Scholarship Program application process for IE students | Informed IE students of career, internship, graduate school, research, and other scholarship opportunities | Participated in IE Industry Advisory Board (IAB) visits | Reviewed and documented corrections and updates to the IE portion of the Undergraduate Catalog | Nominated student representatives from IE to serve on the College of Business and Technology Student Advisory Council | Faculty representative for IE and IIE at the Disability Awareness Day/Week activities | Assisted in the preparation for and participated in Engineer's Day | Contributed to the development of Tenure and Promotion guidelines

Professional service outside the university: Reviewer for five journals, five conference proceedings, and one handbook | Member of the editorial board for one refereed journal | Chaired four conference sessions | Discussant for one conference session | Participated in an Industrial Engineering survey for Texas' 2010 Tuning Oversight Council for Engineering

Research: 23 refereed journal papers; 28 refereed conference proceedings papers; two conference proceedings papers; one book chapter; one encyclopedia contribution; four technical reports; four abstracts; 30 presentations for conferences, universities, and industry

Professional development: Attended six teaching improvement activities | Attended nine professional society conferences and presentations | Attended eight other research conferences and presentations, including a National Science Foundation (NSF) conference | Attended four academic, research, and professional society advising activities | Completed several professional education courses including observation and teaching in secondary public school classrooms | Attended training in TAMUC computer software and related procedures | Attended new faculty conference, luncheon, and workshop at TAMUC

E. Delbert Horton
ASSISTANT PROFESSOR

Dr. Horton specializes in the application of operations research techniques to the design and analysis of personnel and passenger security checkpoint stations. Research and interest has been in the development of improved passenger security flows at the airports since the 9/11 events. He teaches courses in operations research, facilities planning and design, statistical quality control, service systems analysis, engineering management, system engineering, senior engineering design capstone course and project management.

EDUCATION:

Ph.D. Electrical Engineering, University of Texas at Austin, TX, 1973
M.S. Electrical Engineering, Stanford University, Stanford, CA, 1966
B.S. Electrical Engineering, Texas Tech University, Lubbock, TX, 1965

Graduate Studies Degree: Southwestern Graduate School of Banking at Southern Methodist University, Dallas, TX, 1999

EDUCATIONAL EXPERIENCE:

Assistant Professor, Industrial Engineering and Technology Department, Texas A&M University-Commerce, August 2002-Current)

Adjunct Professor, Mathematics Department, University of Texas at Dallas, January 1979 and 1981.

INDUSTRIAL EXPERIENCE:

First National Bank and Cooper Lake Financial Corp.- Cooper, Texas
Chief Executive Officer And Chairman Of Board, 1997-2001

Raytheon Inc. (E-Systems Inc.)-Dallas, Texas
Director, Electronic Warfare and Special Projects, 1990-1997

Electrospace Systems, Inc., Richardson, Texas
Division Manager, Intelligence/Electronic Warfare Systems Division
Division Manager, Signal Processing Division, 1975-1990

Radian Corporation, Austin, Texas. Senior System Engineer, | Tracor, Austin, Texas,
Senior Engineer, 1967-1975, | **COUNSULTANT:** SM&A, Newport Beach, CA,
Associate

PROFESSIONAL REGISTRATION: Registered Professional Engineer in the State of Texas (35986)

PROFESSIONAL SOCIETIES:

1. Institute of Industrial Engineers (IIE), Member
2. Institute of Electrical and Electronics Engineers, Inc. (IEEE), Life Senior Member
3. American Society for Engineering Education (ASEE), Member

PROFESSIONAL DEVELOPMENT ACTIVITIES and CERTIFICATION:

1. AEA/Stanford Executive Management School, Stanford, CA
2. Systems Acquisition Management Course for General/Flag Officers, Defense Systems Management College, DOD, Washington, D.C.
3. Certification of Completion EDUCATOR TRAINING, Texas A&M-Commerce

PUBLICATIONS Refereed (Juried):

Seven publications for presentation and publishment in the national annual American Society for Engineering Education symposium proceedings during 2006 and 2009 and in *Proceedings of the American Society for Engineering Education (ASEE) Global Colloquium on Engineering Education, 2009*. Details will be provided upon request.

UNIVERSITY SERVICE COMMITTEES:

Appointed and is serving on the President's Honorary Degree Selection Committee, Fall 2009 | Member, Executive Advisory Board for College of Business & Technology, 2002-2011 | Chairman, the Computer Science Assistant Professor search committee, Spring 2008 | Senator, Faculty Senate, Texas A&M University-Commerce, 2003-current, and Admission and Retention Committee, 2007 and Executive Committee, 2010-2011 | Member, University Traffic Committee, 2006-current. | Member, Faculty Development Leave Selection Committee, 2006-2010

COMMUNITY SERVICE ACTIVITIES:

1. Investment Officer and Director of Sulphur River Municipal Water District, 2001 – current. | Vice President and a Founding Director, Northeast Texas Mobility Council (NETMOB). 2005 thru 2008. | Trustee of the Frankie McKinney Foundation, Cooper, Texas. | Appointed as a director of the board of the newly formed Sulphur River Regional Mobility Authority(SuRRMA) for the three NE counties(Delta, Hunt, and Lamar). Elected Vice Chairman of the SuRRMA, in September 2008. | Texas Governor Rick Perry appointed Dr. Horton Presiding Officer of the Sulphur River Mobility Authority (SuRRMA), April 19, 2011.

Sukwon Kim, Ph.D.

Assistant Professor of Industrial Engineering

Education:

Ph.D. Virginia Tech

M.S. Virginia Tech

B.S. Kyung-Hee University

Teaching:

IE 211 Engineering Probability and Statistics

IE 305 Facilities Planning and Management

IE 316 Manufacturing Systems Design and Control

IT 340 Quality Management and Improvement

IE 403 Human Factors Engineering

IE 407 Production Systems Operations

TMGT 511 Emerging Technology

SMGT 521 Ergonomics

IT 502 Manufacturing Systems

Peer-reviewed journals:

1. Kim, Sukwon, and TE Lockhart, **2010**, Effects of 8 week-Balance Training or Weight Training for the Independently Living Elderly on the Outcomes of Induced Slips, 33 (1), 49-55, *International Journal of Rehabilitation Research*.

2. Kim, Sukwon, TE Lockhart, and C.S. Nam, **(In press) 2010**, Leg Strength Comparison among Three Different Age Groups; Are Middle-age Workers Safer than Older Workers? *International Journal of Industrial Ergonomics*.

3. Kim, Sukwon, TE Lockhart, and K Roberto, **2009**, The effects of 8-week balance training or weight training for the elderly on fear of falling measures and social activity levels, *Quality in Ageing*. 10(4), 37-48.

4. Lockhart T., Kim, Sukwon, Kapur, R., Jarrott, S., **2009**, Evaluation of gait characteristics and ground reaction forces of cognitively declined older adults with emphasis on slip induced fall accidents, *Assistive Technology*. 21:1-8.

5. Nam, C.S., Lyons, J. B., Hwang, H., & Kim, Sukwon, 2009, The Process of Team Communication in Multi-Cultural Contexts: An Empirical Study Using Bales' Interaction Process Analysis (IPA)," *International Journal of Industrial Ergonomics*, 39(5), 771-782.

6. Kim, Sukwon, and TE Lockhart, **2008**, 10% front load carriage on the likelihood of slips and falls. *Industrial Health*, 46, 32-39.

7. Lockhart, TE and Kim, Sukwon, 2006, Relationship between Hamstring Activation Rate and Heel Contact Velocity: Factors Influencing Age-Related Slip-Induced Falls, *Gait and Posture*, 24, 23-34.

8. Kim, Sukwon, H, Yoon, and T. Lockhart, **2006**, Comparison of spatio-temporal characteristics between young and old adults while walking: factors influencing the likelihood of slip-initiation, *Journal of Ergonomics Society of Korea*, 25 (1), 43-49.

9. Kim, Sukwon, TE Lockhart, and Yoon, H., **2005**, Relationship between age-related gait adaptations and required coefficient of friction, *Safety Science*, 43, 425-436.

10. Kim, Sukwon, J. Lee, K., Park., H, Yoon, and S. Park, 2005, The benefits of stick walking: evaluation at ankle, knee, and hip joints, *Journal of Ergonomics Society of Korea*, 24 (4), 63-71.

Referred conference proceedings:

10. Doan, Huy, Sukwon Kim, David A., Ben C., 2009, Noise level survey at on-campus print-shop, the XXIst Annual International Occupational Ergonomics and Safety Conference, Dallas, Texas, June, 2009.

11. Kim, Sukwon, Ben C., Young S. R., 2009, Fatigue; Working under the influence, the XXIst Annual International Occupational Ergonomics and Safety Conference, Dallas, Texas, June, 2009.

12. Elam, M., Horton, D., Kim, Sukwon, Wilkins B., 2009, A University's approach to teach a freshman level introductory course in industrial engineering, the 116th Annual American Society for Engineering Education Conference and Exposition, Austin, Texas, June, 2009.

13. Kim, Sukwon and TE Lockhart, 2008, Effects of 8-week balance training or weight training for the elderly on the risk of slips while walking on the slippery surface, the XX Annual International Occupational Ergonomics and Safety Conference, Chicago, Illinois, June, 2008.

14. Prakriti Parijat, TE Lockhart, and Sukwon Kim, Influence of localized muscle fatigue of the knee joint on gait parameters related to slip propensity, HFES conference, Baltimore, MD, October, 2007.

15. Kim, Sukwon, and TE Lockhart, 2006, Gait Asymmetry: Factors Influencing Slips Severity and Tendency Among Older Adults. HFES conference, San Francisco, CA, October, 2006.

16. Kim, Sukwon, and TE Lockhart, 2005, Prediction of Fallers and Non-fallers. Presented at ISOES conference, Nevada, Las Vegas, June, 2005.

17. Kim, Sukwon, Lockhart, TE, Yoon, H. and Park M., 2004, Effect of whole body center of mass on friction demand, Presented at HFES conference, New Orleans, Louisiana, September, 2004.

18. Kim, Sukwon and Lockhart TE , 2004, Does front load carriage increase the likelihood of slip-induced falls? Presented at John Hopkins Hospital Symposium, Baltimore, Maryland, USA, May, 2004.

19. Kim, Sukwon, and TE Lockhart, 2002, Age-Related Changes in Hamstring muscle Activation rate and Its Effects on Initiation of Slip While Walking over a Slippery Surface. Presented at IEA conference, Seoul, Korea, August, 2002.

Professional Certificates:

Associate Ergonomics Professional
BasicMOST® Applicator

Professional Memberships and Registrations

The Institute of Industrial Engineers
Alpha Pi Mu (Honor Society for Industrial Engineer)
Human Factors and Ergonomics Society
International Society for Occupational Ergonomics and Safety
Korean-American Scientists and Engineering Association

Perry J. Moler

Department of Engineering & Technology Safety Officer & Technology Assistant

Education

Texas A&M University-Commerce, Commerce, TX, 2009-Aug 2010

M.S. Technology Management

Texas A&M University-Commerce, Commerce, TX, 2002-2005

B.S. Technology Management

Concentration: Industrial Engineering

Graduated: Cum Laude

Hocking College, Nelsonville, OH 1999-2002

A.S. Environmental Restoration

Graduated: Highest Honors

Work History (Academic)

Adjunct Professor (Part Time)

Texas A&M University – Commerce-Commerce, TX Aug 2010-Current

- IT 111 Computer Aided Design
- IT 112 Product Design and Development
- COS 111 Freshman Success Seminar

Safety Officer (Full Time)

Texas A&M University – Commerce, Commerce, TX Aug 2010-Current

- Developing Department Safety Plan
- Teaching students Laboratory safety practices
- Work with the Department of Risk Management

Graduate Assistance (Teaching)

Texas A&M University-Commerce, Commerce, TX, 2009-Aug 2010

- Instructed students on Lab safety procedures
- Developed MSDS and emergency action plans for our engineering labs to be followed by students and faculty

Work History (Non-Academic)

Onsite Manager/ Branch Manager (Full Time)

Solutions Staffing, Columbus, OH 2007-2009

- Job site safety meetings
- Conflict resolution management
- Act as liaison between client and staffing branch office

Maintenance Supervisor (Full Time)

ERMC Malls, Cincinnati, OH 2006-2007

- Subcontractor scheduling
- Safety training
- Blueprint reading & approval

Scheduling Engineer (Full Time)

Kiewit Offshore Services, Corpus Christi, TX 2006

- Project and personnel scheduling for oil production platform

AutoCAD Technician (Part-Time)

Industrial Consortium, Sulphur Springs, TX 2004

- AutoCAD draftsman for project drawing packages for Ocean Spray, Old Orchard Brands, and PepsiCo.

Professional Affiliations

ATMAE, March 2011-Current

Institute of Industrial Engineers, 2004-Current

Toastmasters, 2010-Current

Phi Theta Kappa Honor Society, 2000-Current

Delta Tau Delta Fraternity, 2002-Current

Service Activities

Assistant chapter advisor Delta Tau Delta Fraternity Epsilon Eta Chapter

BEST Robotics Volunteer for the Lion's Pride Hub

Career and Technical Education Judge for Garland ISD

Publications and Presentations

Accepted Presentation 2011 ATMAE Annual Conference: Developing an Effective Laboratory Safety Program for Academic Environments.
(November 2011)

Presentation 2010 Texas A&M University – Commerce Graduate Symposium:
Course Redesign: Involving Project Based Learning

Larry H. Walker, P.E.
Adjunct Professor

Academic Department: Industrial Engineering & Technology

EDUCATION

Master of Science in Industrial Technology
Texas A&M University – Commerce, Commerce, Texas 2006
GPA 4.0

Bachelor of Science in Construction Science
Texas A&M University – Commerce, Commerce, Texas 2004
Graduated Summa Cum Laude, GPA 3.933

TEACHING EXPERIENCE

2006 – Present Instructor & Adjunct Professor
Texas A&M University-Commerce, Commerce, Texas

Courses Taught

IT 111 – Computer-Aided Drafting (AutoCAD)
IT 112 – Product Design & Development (Solid Works)
IT 303 – Industrial Communications
IT 311 – Computer-Aided Industrial Design (Advanced Solid Works)
IT 409 – Contemporary Technology
IT 496 – Engineering Project Management
CONS 331 – Field Engineering & Building Codes
CONS 411 – Architectural Design & Drafting (AutoCAD)
CONS 454 – Contracts & Specifications
CONS 455 – Construction Management I
CONS 456 – Construction Management II

PROFESSIONAL EXPERIENCE

Licensed Professional Engineer (P.E.) and Certified Project Management Professional (P.M.P.) with experience in managing large and small projects from initial and final design through approvals and construction. Extensive experience in land development design for educational facilities, having successfully completed hundreds of projects with construction cost exceeding 1 billion dollars throughout Texas. Recent experience is complemented by earlier experience as a Senior Project Manager in civil engineering firms, leading a variety of projects including land development design, utilities, roadways and drainage analysis for commercial, residential, governmental and educational facilities. Presently Owner & President of a private civil engineering firm and serves as adjunct faculty in the Industrial Engineering & Technology, Texas A&M University – Commerce.

PROFESSIONAL

Alpha Chi – National College Honor Scholarship Society, Member

Alpha Sigma Lambda National Honor Society, Member

Licensed Professional Engineer - Texas # 101315

American Society of Civil Engineers, Member

National Society of Professional Engineers, Member

Texas Society of Professional Engineers, Member

Project Management Professional, PMP Cert.# 205925

Project Management Institute, Member

Society for Marketing Professional Services (SMPS), Member

American Institute of Architects, Associate

Texas Society of Professional Surveyors, Affiliate

American & Texas Institute of Building Design (NCBDC Certified Professional Building Designer)

American & Texas Public Works Association, Member

RESEARCH INTEREST

Evaluating technologies in engineering, construction materials, methods, and management systems to stream line processes, improve overall quality and reduce resources.

Appendix C – Equipment

The following major pieces of equipment and computing resources that are available to be used in support of instruction and research.

A. Instructional Equipment and Tools

- Uprint rapid prototyping machine
- FDM 3000 rapid prototyping machine
- Programmable Logic Controller (PLC) trainers
- Bridgeport EZ TRAK mill
- Bridgeport EZ PATH lathe
- Bridgeport HTC-8 Turning Center
- Flock of birds motion detector system
- Force plate system
- Computer Integrated Manufacturing training center
- Drill presses
- Table & band saws
- Robotic equipment
- Ergonomic hand tools
- Hand tools
- Electronic test meters
- 28 seat computer lab
- 23 seat computer lab

B. Instructional Software

- SolidWorks
- AutoCAD
- Minitab
- Arena
- MultiSIM
- Microsoft Office Applications

C. Systems Engineering Lab (undergraduate research & industry sponsored projects)

- Computers & printers
- Adobe Acrobat Professional
- Adobe Dreamweaver
- Arena (Process simulation)
- AutoCAD (CAD)
- Camtasia (Video and audio recorder/editing software)
- ExtendSim Suite (Process simulation)
- Minitab (Statistical and process management)
- Risk Solver Premium (Linear programming)
- SAS Analytics (Predictive & descriptive modeling)
- Microsoft Office

Appendix D – Institutional Summary

1. The Institution

- a) Name and address of the institution

Texas A&M University-Commerce
P.O. Box 3011
Commerce, Texas 75429

- b) Name and title of the chief executive officer of the institution

Dr. Dan Jones
President & Chief Executive Officer

- c) Name and title of the person submitting the self-study report

Dr. Brent Donham
Department Head & Associate Professor
Department of Engineering & Technology

- d) Name the organizations by which the institution is now accredited and the dates of the initial and most recent accreditation evaluations.

Commission on Colleges of the Southern Association of Colleges and Schools
(1866 Southern Lane, Decatur, Georgia 30033-4097; Telephone 404-679-4501)
To award bachelor's, master's, and doctoral degrees.
Accreditation: 2003
Next Accreditation Visit: 2013

The Engineering Accreditation Commission of ABET
111 Market Place, Suite 1050
Baltimore, MD 21202-4012
Telephone: (410) 347-7700
Initial Accreditation: 2005
Next Accreditation Visit: 2011

The Association to Advance Collegiate Schools
of Business - AACSB International
Initial Accreditation: 1976
Last Accreditation: 2009

State Board for Educator Certification
Last Accreditation: 2007

The National Association of Schools of Music
Initial Accreditation: 1969
Next Accreditation: 2015

The Council on Social Work Education
Initial Accreditation: Bachelor's 1978 Master's 2001
Next Accreditation: Bachelor's 2017 Master's 2017

American Chemical Society,

Council for Accreditation of Counseling and Related Educational Programs,
Accreditation: 1991

Masters in Psychology Accreditation Council
Initial Accreditation: 1998
Last Accreditation: 2008

2. Type of Control

Texas A&M University-Commerce is public institution that was established in 1889. It is the fifth oldest state university. A&M-Commerce has been a member of the Texas A&M University-System since 1996.

3. Educational Unit

The administrative chain of responsibility for the Industrial Engineering program is shown in Figure D-1.

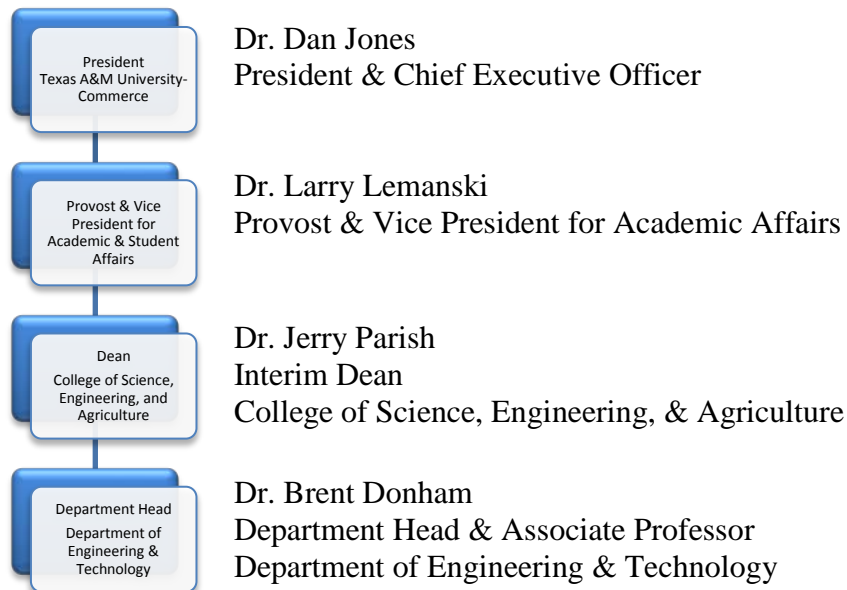


Figure D-1: Industrial Engineering Administrative Structure

4. Academic Support Units

Chemistry Department
Dr. Ben Jang
Department Head & Professor

Mathematics Department
Dr. Charles Dorsett
Department Head & Associate Professor

Physics Department
Dr. Bao-An Li
Department Head & Professor

Computer Science & Information Systems Department
Dr. Sang Suh
Department Head

University College
Dr. Ricky Dobbs
Dean

5. Non-academic Support Units

Writing Center (tutoring)
Dr. Tabetha Adkins
Director

Math Lab (tutoring)
Math Department
Dr. Charles Dorsett, Department Head

Technology Services
Michael Cagle
Director of Information Technology

Student Access & Success (registrar and admissions)
Dr. Mary Hendrix
Vice President

Instructional Technology
Mike Smith
Interim Director

Institutional Advancement
Randy VanDeven, PE

Vice President

James G. Gee Library
Gregory A. Mitchell
Director of Libraries

Training and Development
Heidi Wright
Training & Development Manager

Counseling Center
Dr. Linda Clinton
Director

Career Development
Tina Boitnott
Director

International Student Services
John Jones
Director

Honors College
Dr. Ray Green
Dean

6. Credit Unit

Texas A&M University-Commerce uses the semester system. One semester credit hour equates to one lecture hour or 2-3 laboratory hours per week. The academic year includes two long semesters (Fall, Spring), an August mini, a winter mini, a May mini, and two summer semesters. Industrial engineering courses are only offered during the 15-week long semesters.

7. Tables

The program enrollment and degree and personnel data are shown in Tables D-1 and D-2 respectively.

Table D-1. Program Enrollment and Degree Data

Bachelor of Science in Industrial Engineering

	Academic Year		Enrollment Year					Total Undergrad	Total Grad	Degrees Awarded			
			1st	2nd	3rd	4th	5th			Associates	Bachelors	Masters	Doctorates
Current Year	'10-'11	FT	45					45	0	0	6	0	0
		PT	1					1	0				
1	'09-'10	FT	33	19				52	0	0	2	0	0
		PT	1	3				4	0				
2	'08-'09	FT	34	20	22			76	0	0	12	0	0
		PT	2	2	0			4	0				
3	'07-'08	FT	31	11	15	21		78	0	0	3	0	0
		PT	3	3	4	3		13	0				
4	'06-'07	FT	28	19	7	9	2	65	0	0	11	0	0
		PT	0	2	3	3	0	8	0				

Enrollment data provided by A&M-Commerce's Office of Institutional Research.

The 1st Enrollment year represents the freshman class for the specified academic year. The 2nd Enrollment year represents the Sophomore year of the cohort, 3rd is the junior year, 4th is the senior year, and 5th is the fifth-year seniors.

Give official fall term enrollment figures (head count) for the current and preceding four academic years and undergraduate and graduate degrees conferred during each of those years. The "current" year means the academic year preceding the fall visit.

FT--full time
PT--part time

Table D-2. Personnel

Bachelor of Science in Industrial Engineering

Year¹: Fall 2010

	HEAD COUNT		FTE ²
	FT	PT	
Administrative ³ (Dept. Head)	1	0	0.50*
Faculty (tenure-track)	3	0	3.00
Other Faculty (excluding student Assistants)	0	0	0.00
Student Teaching Assistants	0	0	0.00
Student Research Assistants	0	0	0.00
Technicians/Specialists	1	0	0.50
Office/Clerical Employees	1	0	0.25
Others ⁴ (Adjuncts)	0	2	0.75

*0.50 FTE for Department Head includes 25% administrative and 25% teaching in IE program.

Report data for the program being evaluated.

- ¹ Data on this table should be for the fall term immediately preceding the visit. Updated tables for the fall term when the ABET team is visiting are to be prepared and presented to the team when they arrive.
- ² For student teaching assistants, 1 FTE equals 20 hours per week of work (or service). For undergraduate and graduate students, 1 FTE equals 15 semester credit-hours (or 24 quarter credit-hours) per term of institutional course work, meaning all courses — science, humanities and social sciences, etc. For faculty members, 1 FTE equals what your institution defines as a full-time load.
- ³ Persons holding joint administrative/faculty positions or other combined assignments should be allocated to each category according to the fraction of the appointment assigned to that category.
- ⁴ Specify any other category considered appropriate, or leave blank.

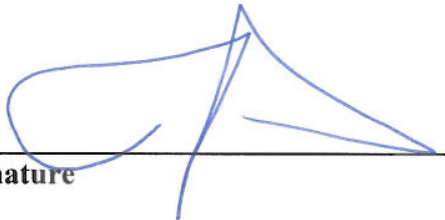
Signature Attesting to Compliance

By signing below, I attest to the following:

That the Bachelor of Science in Industrial Engineering has conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with ABET's *Criteria for Accrediting Engineering Programs* to include the General Criteria and any applicable Program Criteria, and the *ABET Accreditation Policy and Procedure Manual*.

JERRY D. PARISH

Dean's Name (As indicated on the RFE)


Signature

6-30-2011
Date