



CATALOG YEAR 2006-2008
(Please use separate form for each add/change)

COLLEGE: Arts and Sciences

Current Catalog Page(s) Affected N/A

Course: Add: _____ Delete: _____ Change: Number _____ Title _____
(check all that apply) SCH _____ Description _____ Prerequisite _____

If new, provide Course Prefix, Number, Title, SCH Value, Description, prerequisite, and lecture/lab hours if applicable. If in current catalog, provide change and attach page with changes in red and provide a brief justification.

Program: Add: X Change: _____

Attach new/changed Program of Study description and 4-year plan. If in current catalog, provide change and attach page with changes in red.

Remark: Attached is the proposed program for the Engineering track in the proposed Systems Engineering program; pending approval

Minor: Add: _____ Delete: _____ Change: _____

Attach new/changed minor. If in current catalog, provide change and attach page with changes in red.

Faculty: Add: _____ Delete: _____ Change: _____

Attach new/changed faculty entry. If in current catalog, provide change and attach page with changes in red.

College Introductory Pages: Add information: _____ Change information: _____

Attach new/changed information. If in current catalog, provide change and attach page with changes in red.

Approvals:	Signature	Date
Chair Department Curriculum Committee	_____	_____
Chair Department	_____	_____
Chair College Curriculum Committee	_____	_____
Dean	_____	_____

Bachelor of Science
Major in Systems Engineering (Engineering Track)

Following is one suggested four-year degree plan. Students are encouraged to see their advisor each semester for help with program decisions and enrollment. Students are responsible for reviewing the Program of Study Requirements.

*See Appendix A Core Curriculum and Optional Course Information

FALL FRESHMAN YEAR	HOURS	SPRING FRESHMAN YEAR	HOURS
COSC 1336/1136	4	Soc/Beh Science	3
ENGL 1301	3	ENGL 1302	3
MATH 2413	4	MATH 2414	4
PHYS 2325/2125	4	PHYS 2326/2126	4
ENGR 1201	2	ENGR 1204	2
UNIV 1101	(1)	Hlth/Wellness	1
		UNIV 1102	(1)
TOTAL	17 (18)	TOTAL	17 (18)
FALL SOPHOMORE YEAR		SPRING SOPHOMORE YEAR	
HIST 1301	3	HIST 1302	3
MATH 2415	4	MATH 3310	3
ENGR 2303/2103	4	ENGR 2305/2105	4
COMM ELECTIVE	3	SENG 2372	3
PSCI 2305	3	PSCI 2306	3
TOTAL	17	TOTAL	16
FALL JUNIOR YEAR		SPRING JUNIOR YEAR	
ENGR 2370/2170	4	SENG 3301	3
SENG 3310	3	SENG 3330	3
ENGR 2376	3	SENG 3380	3
SENG 3300	3	SENG 3340	3
SENG 3320	3	SENG 3370	3
TOTAL	16	TOTAL	15

**FALL
SENIOR YEAR**

SENG 4340	3
SENG 3350	3
HUM ELECTIVE	3
SENG 4330	3
ENGR/BUSIN FREE ELECTIVE	3

TOTAL 15

**SPRING
SENIOR YEAR**

SENG 4350	3
SENG 4360	3
SENG 4390	3
ENGR/BUSIN FREE ELECTIVE	3
VISUAL/PERF ARTS ELECTIVE	3

TOTAL 15

Bachelor of Science in Systems Engineering Degree Requirements

The B S in Systems Engineering Degree offers two tracks: engineering track and business track.

Engineering Track

Category	Semester Credit Hours	Clock Hours
General Education Core Curriculum <i>(bachelor's degree only)</i>	42	
Required Courses	50	
Prescribed Engineering Electives	18	
Required Mathematics Courses	11	
Business/Engineering Free Electives	6	
University Orientation Classes	2	
Other <i>(Specify, e.g., internships, clinical work)</i>	(if not included above)	
TOTAL	129	

Business Track

Category	Semester Credit Hours	Clock Hours
General Education Core Curriculum <i>(bachelor's degree only)</i>	42	
Required Courses	50	
Prescribed Business Electives	18	
Required Mathematics Courses	11	
Business/ Engineering Free Electives	6	
University Orientation Classes	2	
Other <i>(Specify, e.g., internships, clinical work)</i>	(if not included above)	
TOTAL	129	

The 42 semester credit hours of general education core curriculum requirements at TAMIU are not included in the table below. Students will take Calculus I and University Physics I and II as part of the core curriculum.

Prefix and Number	Required Courses	SCH
COSC 1136	Fundamentals of Programming Laboratory	1
COSC 1336	Fundamentals of Programming	3
ENGR 1201	Foundations of Engineering I	2
ENGR 1204	Engineering Graphics	2
ENGR 2303	Engineering Mechanics-Statics & Dynamics	3
ENGR 2103	Engineering Mechanics-Statics & Dynamics Laboratory	1
ENGR 2305	Principles of Electrical Engineering	3
ENGR 2105	Principles of Electrical Engineering Laboratory	1
ENGR 2370	Introduction to Industrial and Systems Engineering	3
ENGR 2170	Introduction to Industrial and Systems Engineering Laboratory	1
ENGR 2372	Introduction to Design of Experiments	3
ENGR 2376	Conservation Principles in Thermal Engineering	3
SENG 3300 (*)	Engineering Economics	3
SENG 3301 (*)	Technical Communication	3
SENG 3310 (*)	Introduction to Control Systems Engineering	3
SENG 3320 (*)	Engineering Modeling and Design	3
SENG 3330 (*)	Operations Research I	3
SENG(*) 3340	Robotics and Automation	3
SENG(*) 3350	Production Planning and Control	3
SENG 3380 (*)	Engineering Statistics, Quality Control, and Forecasting	3

Prefix and Number	Prescribed Elective Courses (Engineering Track)	SCH
SENG(*) 3370	Introduction to Computer Integrated Manufacturing	3
SENG(*) 4330	Operations Research II	3
SENG 4340 (*)	Intelligent Systems	3
SENG 4350 (*)	Facilities Design and Logistics	3
SENG(*) 4360	Systems Simulation	3
SENG 4390 (*)	Systems Engineering Senior Project	3

Prefix and Number	Prescribed Elective Courses (Business Track)	SCH
MKT 3310	Principles of Marketing	3
MIS 3310	Management Information Systems	3
TIL 3310	Principles of Transportation	3
TIL 3311	Export/Import Operations and Practice	3
TIL 3340	Business Logistics Management	3
BA 4399	Special Issues in Business	3

Prefix and Number	Required Mathematics Courses (Engineering Track and Business Track)	SCH
MATH 2414	Calculus II	4
MATH 2415	Calculus III	4
MATH 3310	Introduction to Linear Algebra	3

Prefix and Number	Business and Engineering Electives	SCH
BA 3320	International Business	3
MGT 3310	Principles of Management	3
MKT 3325	Marketing Channels	3
SENG(*) 4370	Introduction to Virtual Manufacturing	3
SENG(*) 4380	Total Quality Engineering	3
SENG(*) 4195-4395	Undergraduate Research	1-3
SENG(*) 419904399	Special Topics in Systems Engineering	1-3

Systems Engineering

Undergraduate Course Descriptions

02/19/07

*indicates new course

+ indicates new course has been approved by Curriculum Committees

Core Courses

+**COSC 1336** *Fundamentals of Programming*. **Three semester hours**. This course introduces fundamentals of a high-level programming language. Students, applying rules of syntax and semantics, develop the skills in program design, implementation and debugging to solve computational problems in the programming language. No programming or computer science experience is required. High school BCIS as well as basic Algebra abilities are helpful. Co-requisite: COSC 1136.

+**COSC 1136** *Fundamentals of Programming Laboratory*. One semester hour. Laboratory course to accompany COSC 1336. Laboratory exercises reinforce the particular paradigms that are stressed in COSC 1336. Students will develop and run functional programs that solve elementary algorithmic problems. Students will also gain experience with compiling, finding, correcting syntax errors, and executing programs. This course places importance on scientific communication and collaboration methods. Co-requisite: COSC 1336. Lab Fee: \$30.00

+**ENGR 1201** *Foundations of Engineering I*. Two semester hours. (*) Introduction to the engineering profession, ethics and disciplines, development of skills in teamwork, problem solving, logic processing, design and drawing; emphasis on computing applications and CAD tools. Co-requisite: MATH 2413.

+**ENGR 1204** *Engineering Graphics*. Two semester hours. (*) Orthographical drawings, auxiliary view and sections views and dimensioning are introduced. Tolerance, working drawings, three dimensional pictorials, primary and successive auxiliary view and vector graphics are presented. Computer aided software such as Auto-CAD will be used for drawing and development of systems in mechanical, electrical and welding applications. Prerequisite: ENGR 1201

+**ENGR 2303** *Engineering Mechanics-Statics & Dynamics*. Three semester hours. (*) Application of the fundamental principles of Newtonian mechanics to the statics and dynamics of particles and the equilibrium of trusses, frames, beams and other rigid bodies. Prerequisite or Co-requisite: PHYS 2326 and 2126 Co-requisite: MATH 2415 and ENGR 2103

+**ENGR 2103** *Engineering Mechanics-Statics & Dynamics Laboratory*. One semester hour. (*) Laboratory course to accompany ENGR 2303. Laboratory exercises reinforce ENGR 2303 lecture material and place importance on scientific communication and

collaboration. Co-requisite ENGR 2303.

+ENGR 2305 *Principles of Electrical Engineering*. Three semester hours. (*)
Fundamentals of electrical circuits analysis, AC power and electronics, intended as a terminal course in these areas for most engineering disciplines. Prerequisites: ENGR 2303; Co-requisite: ENGR 2105.

+ENGR 2105 *Principles of Electrical Engineering Laboratory*. One semester hour. (*)
**Laboratory course to accompany ENGR 2305. Laboratory exercises reinforce ENGR 2305 lecture material and place importance on scientific collaboration. Co-requisite: ENGR 2305/2105.

+ENGR 2370 *Introduction to Industrial and Systems Engineering*. Three semester hours.
(*)A comprehensive introduction to the history, philosophies, methodologies, and techniques of industrial and systems engineering. Prerequisites: ENGR 2303 and ENGR 1204. Co-requisite: ENGR 2170.

+ENGR 2170 *Introduction to Industrial and Systems Engineering Laboratory*. One semester hour. (*)Laboratory course to accompany ENGR 2370. Laboratory exercises reinforce ENGR 2370 lecture material and place importance on scientific collaboration. Co-requisite: ENGR 2370 . Prerequisite: ENGR 1204, ENGR 2303.

+ENGR 2372 *Introduction to Design of Experiments*. Three semester hours. (*)
Basic probability theories and hypothesis testing introduced. Single factor ANOVA. Randomized blocks and Latin squares, two-factorials and 2k factorial designs, robust parameter design and uncertainty analysis. Software packages will be used for data mining and interpretation with application to engineering systems and/or other systems. Prerequisites: ENGR 1201, MATH 2413

+ENGR 2376 *Conservation Principles in Thermal Sciences*. Three semester hours. (*)
Theory and application of energy methods in engineering; conservation principles to investigate “traditional” thermodynamics and internal flow fluids. Prerequisites: ENGR 2303, MATH 2415 or concurrent registration therein.

SENG 3300 *Engineering Economics*. Three semester hours. (*)
Principles of engineering economics including economic equivalence, time value of money, analysis of single and multiple investments, comparison of alternatives; capital recovery and tax implications; certainty; uncertainty; risk analysis; public sector analysis and break-even concepts. Prerequisites: Math 2414, ENGR 2372.

SENG 3301 *Technical Communication*. Three semester hours. (*)
Process of developing and presenting field-specific technical information related to engineering, including researching, drafting, editing, revising, and designing technical reports, proposals, manuals, resumes and professional correspondence for specific audiences. Junior or senior only. Prerequisite: ENGL 1302

SENG 3310 *Introduction to Control Systems Engineering*. Three semester hours. (*)

Analysis and synthesis of controlled, dynamic, linear mechanical, electrical, fluid and/or thermal systems; introduction to concepts of stability, controllability, observability, and to discrete time, sampled data control systems, optimal control systems and nonlinear control theory. Prerequisites: ENGR 2303, ENGR 2372

SENG 3320 *Engineering Modeling and Design*. Three semester hours. (*) Fundamentals of modeling and specifications engineering design, reverse engineering, computer-aided design, rapid prototyping, and manufacturing. Application of the design process and problem solving through individual and/or team projects. Prerequisites: ENGR 1204, ENGR 2305, ENGR 2372

SENG 3330 *Operations Research I*. Three semester hours. (*) Introduction to the fundamental deterministic analytical methods and their applications to industrial and systems engineering. Modeling and decision making. Methods include linear programming, integer programming, dynamic programming, and nonlinear programming. Prerequisite: MATH 3310, SENG 3320

SENG 3340 *Robotics and Automation*. Three semester hours. (*) Study of the use, design, and deployment of industrial automation and robotics technologies in high-precision, multi-product manufacturing environments. Robot manipulators, kinematics and dynamics, robot automation and control, integrated robotic systems for manufacturing, automation in manufacturing, automation in service industry, applications to industrial systems. Prerequisite: SENG 3310.

SENG 3350 *Production Planning and Control*. Three semester hours. (*) Coordination of activities of manufacturing and services systems. System design, inputs and outputs, planning and scheduling. Inventory controls and supply chains management with the employment of linear programming. Job scheduling on flexible manufacturing lines. Prerequisite: SENG 3300, SENG 3330.

SENG 3380 *Engineering Statistics, Quality Control, and Forecasting*. Three semester hours. (*) Statistical methods to monitor and improve product quality and reduce the manufacturing variations. Variable and attribute control charts or statistical process charts. Acceptance sample methods. Process capability indexes. Forecasts based on moving average, exponential smoothing, and regression analysis will be studied. Prerequisite: ENGR 2372

Elective Courses

Engineering Track

SENG 3370 *Introduction to Computer Integrated Manufacturing*. Three semester hours. (*) Programmable automation applied to manufacturing systems. Programmable logic controllers, sensors, and data acquisition. Continuous and discrete control system design and analysis. Computer control of manufacturing processes and integration. Communications through local areas networks. Prerequisite: ENGR 2370

SENG 4330 *Operations Research II*. Three semester hours. (*)

Introduction to the fundamental probabilistic analytical methods and their applications to industrial and systems engineering. Modeling and decision making with uncertainties. Methods include Markov chains, Poisson processes, renewal theories and queuing systems with application to production systems and inventory controls. Prerequisites: SENG 3330, SENG 3380

SENG 4340 *Intelligent Systems*. Three semester hours. (*)

Introduction to methods for the analysis and design of intelligent engineering systems. Topics include reinforcement learning, optimal estimation, Bayesian networks, expert systems, neural networks, and genetic algorithms. Applications emphasize control and decision making in engineering, finance, and computer science. Prerequisites: SENG 3340, SENG 3370

SENG 4350 *Facilities Design and Logistics*. Three semester hours. (*)

Design and analysis of models and algorithms for facility location, vehicle routing, and facility layout problems. Emphasis will be placed on both the use of computers and the theoretical analysis of models and algorithms in the design of production/service facilities. Fundamental concepts applied through a sequence of design projects. Prerequisite: ENGR 2372, SENG 3350

SENG 4360 *Systems Simulation*. Three semester hours. (*)

Study the structure, logic, methodologies, and computer techniques for simulating systems. Topics include fundamentals of discrete simulation, design-modeling and subsequent analysis, model verification and validation, and understanding and predicting the behavior of systems. Prerequisites: COSC 1336, COSC 1136, SENG 3350

SENG 4390 *Systems Engineering Senior Project*. Three semester hours. (*)

This capstone course provides students the experience of planning and designing an integrated enterprise project that incorporates operational cost analysis in the choice of product and selection of manufacturing process. Requires integration of knowledge from all required systems engineering courses.. Prerequisites: Senior standing and 12 sch Engineering Track courses or concurrent enrollment.

Business Track

MKT 3310: *Principles of Marketing*. Three semester hours.

An introductory course in marketing presenting the basic components of marketing including product policy, promotion, pricing, and distribution of goods, services and ideas to consumers and other buyers within a set of environmental forces that affect marketing decisions. Written and/or oral presentations are required. Prerequisite: Junior standing.

MIS 3310: *Management Information Systems*. Three semester hours.

Theory, capabilities, applications, benefits, liabilities and economics of business computer information systems. Using the computer to solve business problems.

Management information systems and computer-based decision support is emphasized. The standard support application packages will be used. Written and/or oral presentations are required. Prerequisite: MIS 1305 or equivalent.

TIL 3310 *Principles of Transportation*. Three semester hours.

A study of the field of domestic freight and passenger transportation as an environment in which users (shippers, receivers, passengers), providers (carriers) and the government (federal, state, local) operate. Management strategy and decision making of the business firm as user of transportation services are emphasized, as well as domestic intercity transportation of property (freight). Prerequisite MKT 3310.

TIL 3311 *Export/Import Operations and Practice*. Three semester hours.

Introduction to export and import procedures, international trade terms and applications, government regulations affecting trade, international commercial banking facilities and practices, commercial credit and practices, foreign trade documentation, and export/import traffic forwarding.

TIL 3340: *Business Logistics Management*. Three semester hours.

Examination of logistic systems and management, including coverage of inventory, warehousing traffic, materials and handling, packaging, order processing, and customer service- levels. Prerequisite: MKT 3310.

BA 4399 *Special Issues in Business*. Three semester hours.

A problems course focusing on current issues. May be repeated once when topic changes.

Electives

BA 3320 *International Business*. Three semester hours. An introductory course in international business, it provides an interdisciplinary business background for understanding the growing commercial and economic interdependence among nations and the complexities of doing business across national boundaries. Written and/or oral presentations are required.

MGT 3310 *Principles of Management*. Three semester hours.

This course is a study of managerial concepts, principles (planning, organizing, directing and controlling), and analysis of organizational behavior (needs, motivations, personality, leadership, group dynamics and communication). Various conceptual and practical approaches of management for creating a quality work life will be included.

MKT 3325. *Marketing Channels*. Three semester hours.

A study of alternative channels of distribution directing products from producers to consumers. The course focuses on intermediaries, found in most channels, who perform a variety of functions as independent organizations. Best known among such middlemen for consumer products are wholesalers and retailers. Prerequisite: MKT 3310.

SENG 4370 *Introduction to Virtual Manufacturing*. Three semester hours. (*)

Introduction to virtual manufacturing, its applications, and key research issues in this contemporary field of systems engineering. Prerequisites: SENG 3370

SENG 4380 *Total Quality Management in Engineering*. Three semester hours. (*)

Principles and practices of total quality management (TQM). Basic TQM concepts of leadership, customer satisfaction, employee involvement, continuous improvement and performance measures. Tools and techniques of TQM including statistical process controls, quality function deployment, failure mode and effect analysis, and total productive maintenance. Prerequisites: SENG 3380

SENG 4195-4395 *Undergraduate Research*. One to three semester hours. (*)

Permits work on special project in systems engineering. Prerequisite: Permission of instructor.. Prerequisite: Senior classification in systems engineering.

SENG 4199-4399 *Special Topics in Systems Engineering*. One to three semester hours. (*)

Topics selected from contemporary developments in the field of systems engineering. May be repeated when topic changes. Prerequisite: Permission of instructor.

