Approved BSIE Technical Electives
March 5, 2015

The following courses are approved technical electives for the BSIE program. When you register for a course on this list (except where you only get credit for 1 of 3 courses in a group as indicated below), it will automatically be recorded as a technical elective on your audit. Other Science, Technology, Engineering and Mathematics (STEM) courses may be acceptable as technical electives but departmental approval is required on a case by case basis. You must earn a “C” or better to receive technical elective credit.

**IE Undergraduate Courses**

**EIN 4214 ECS-IEMS 3(3,0)**

**EIN 4545 ECS-IEMS 3(3,0)**
Industrial Engineering Applications in The Service Industries: PR: ESI 4312 with “C” or better; or C.I. Application of industrial engineering principles to improve the quality and productivity of service industries such as restaurants, banks, hotels, health care, etc. *Fall.*

**IE Graduate Courses – Can be taken by BSIE-MSIE students or seniors with a GPA ≥ 3.0 Note: You must pay the graduate rate per hour but Bright Futures Scholarships will pay for the UG portion. 5xxx courses will receive credit in the UG program with a “C” or better and also transferred toward an Industrial Engineering Master’s at UCF with a grade of “B” or better.**

**EIN 5117 ECS-IEMS 3(3,0)**
Management Information Systems I: PR: C.I. The design and implementation of computer-based Management Information Systems. Consideration is given to the organizational, managerial, and economic aspects of MIS. *Spring.*

**EIN 5140 ECS-IEMS 3(3,0)**
Project Engineering: PR: Graduate standing or C.I. Role of engineer in project management with emphasis on project life cycle, quantitative and qualitative methods of cost, schedule, and performance control. *Fall, Spring.*

**EIN 5251 ECS-IEMS 3(3,0)**
Usability Engineering: PR: STA 3032 or equivalent. Usability paradigms/principles; cognitive walk-throughs; heuristic, review-based, model-based, empirical and storyboard evaluation; techniques; query techniques; laboratory techniques; and field study approaches. *Odd spring.*
EIN 5255C ECS-IEMS 3(2,2)
Interactive Simulation: PR: Graduate standing or C.I. Introduction to significant topics relative to the development and use of simulators for knowledge transfer in the technical environment. Fall.

ESI 5219 ECS-IEMS 3(3,0)
Engineering Statistics: PR: C.I. Discrete and continuous probability distributions, hypothesis testing, regression, nonparametric stats and ANOVA. Fall, Spring.

ESI 5227 ECS-IEMS 3(3,0)
Total Quality Improvement: PR: STA 3032 or equivalent. Quality improvement (QI) tools and techniques, advanced QI techniques, quality improvement systems, total quality management concepts and implementation, planning and management tools, and case studies. Occasionally.

ESI 5236 ECS-IEMS 3(3,0)
Reliability Engineering: PR: ESI 4234 or equivalent, or C.I. Reliability theory and modeling approaches. Topics include: failure data analysis, maintainability, reliability standards (DOD), software reliability, reliability in design, and electronic systems reliability. Fall.

You may receive technical elective credit for one of the following three courses. Your audit will automatically record the first course registered from this group and apply it as an approved tech elective.

EGN 4641C ECS-ECS 3(2,2)
Engineering Entrepreneurship: PR: Senior standing, GEB 4152, or C.I. All aspects of a successful engineering entrepreneurship enterprise. Content includes lectures, case studies, and seminars. Active student participation. Course material is augmented through seminars given by engineers, business people, and specialists, based on their own experiences. Occasional.

ENT 4183 BA-MAN 3(3,0)

MAR 3391 BA-MAR 3(3,0)
Professional Selling: PR: Sophomore standing in a STEM major with a grade of C (2.0) or better. Written and verbal communications skills applied to marketing settings. A significant portion of the course is devoted to the study of professional selling. Fall, Spring.
Other Relevant Courses for IEs

General Engineering

EGN 3331 ECS-CECE 3(3,0)

EGN 3365 ECS-MMAE 3(3,0)
Structure and Properties of Materials: PR: CHS 1440 and MAC 2312. Atomic structure and bonding, crystal structure and imperfections, solidification, phase transformations, phase diagrams, heat treatment, mechanical & electrical properties, materials characterization techniques. Fall, Spring

EGN 4060C ECS-ECS 3(2,3)
Introduction to Robotics: PR: COP 3223 or EGN 3211; and EEL 3657 or EEL 4742C or COP 3503C or EGN 3321 or EML 3217. Theory and application of robotics topics including; architecture, path planning, sensing and manipulation. Fall.

EGN 4706C ECS-MECH/AERO 3(2,4)
Small Satellite Payloads and Integration: PR: EML 3303C OR EAS 3800C OR EEL 3801C OR ESI 4523C. Evaluate overall impact of integration and design concepts on various satellite component subsystems and their payloads into a small satellite system design leading to a final configuration. Occasional. M&S fee $45.00

EGN 4707C ECS-MECH/AERO 3(2,4)
Processing Space-Launch Systems: PR: For ECE: EEL 3552C or EEL 4742C; For IEMS: ESI 4523C; For MAE: EAS 3800C. Assembly and test techniques for preparing and check-out of the space-launch system “Inertial Upper Stage.” Occasional.

Computer Science

CIS 3360 ECS-CS 3(3,0)

COP 3330 ECS-CS 3(3,0)
Object Oriented Programming: PR: COP 3223 or EGN 3211. Object oriented programming concepts (classes, objects, methods, encapsulating, inheritance, interfaces) and the expression of these concepts in the programming languages such as JAVA. Fall, Spring, Summer
COP 3502C ECS-CS 3(3,1)
Computer Science I: PR: (COP 3223 or EGN 3211) and MAC 1105C. Problem solving techniques, order analysis and notation, abstract data types, and recursion. Fall, Spring.

COT 3100C ECS-CS 3(3,1)

Environmental Engineering

ENV 3001 ECS-CECE 3(3,0)
Introduction to Environmental Engineering: PR: MAC 2312 and CHM 2045C or CHS 1440 both with a grade of “C” (2.0) or better. Introduction to concepts and terminology of environmental engineering. Stresses material and energy balances. Covers air, water and land pollution. Fall, Spring.

Electrical Engineering

EEE 3342C ECS-ECE 3(2,3)
Digital Systems: PR: MAC 2311C, MAC 2312, PHY 2048C, PHY 2049C all with a “C” (2.0) or better grade. Combinational and sequential logic circuits including registers, arithmetic units, memories, finite state machines, and design with programmable logic devices. Fall, Spring. M&S fee $9.00

EEL 4660 ECS-ECE 3(3,0)
Robotic Systems: PR: EGN 4060C or EEL 4742C or COP 3503C. Team based development of a robotic system incorporating concepts such as sensing, computer vision, machine learning, localization, mapping, manipulation and locomotion. Spring

EEL 4890 ECS-ECE 3(3,0)

Mathematics

MAP 4103 COS-MATH 3(3,0)

MAP 4113 COS-MATH 3(3,0)
MAP 4153 COS-MATH 3(3,0)
Vector and Tensor Analysis: PR: MAC 2313 and MAS 3105, or C.I. Vector calculus. The theorems of Green, Gauss and Stokes. Introduction to tensors. Application in engineering and physical sciences. Fall.

MAP 4171 COS-MATH 3(3,0)
Optimization: PR: MAC 2313, MAP 2302, and MAS 3105, or C.I. Linear programming, dynamic programming, control theory, integer programming. Occasional.

MAP 4303 COS-MATH 3(3,0)

MAP 4341 COS-MATH 3(3,0)

MAP 4371 COS-MATH 3(3,0)

MAP 4384 COS-MATH 3(3,0)

MAS 3105 COS-MATH 4(4,0)
Matrix and Linear Algebra: PR: MAC 2312 with "C" or better or C.I. Matrices, determinants, vector spaces in R^n, linear independence, basis, solutions of systems, range of linear transformations, eigenvectors, Jordan Canonical Form, matrix functions, quadratic forms. Fall, Spring. (MAS 3105 is considered an elective only for 2012 and prior catalogs.)

Statistics

STA 4102 COS-STAT 3(3,0)
**Computer Processing of Statistical Data:** PR: STA 4163 and knowledge of a programing language. Use of packages such as SAS, BMD, SPSS for data validation, description and analysis of data, regression and analysis of variance and covariance. Fall.

**STA 4164 COS-STAT 3(3,0)**
**Statistical Methods III:** PR: STA 4163. A continuation of STA 4163, including further study of regression, analysis of variance and covariance and multiple comparisons. *Fall, Spring.*

**STA 4222 COS-STAT 3(3,0)**

**STA 4321 COS-STAT 3(3,0)**
**Statistical Theory I:** PR: STA 2023 or STA 3032; CR: MAC 2313. Probability axioms, discrete and continuous sample spaces, conditional probability, independence, one-dimensional random variables, moment generating functions, transformations, jointly distributed random variables. *Fall.*

**STA 4322 COS-STAT 3(3,0)**

**STA 4502 COS-STAT 3(3,0)**
**Nonparametric Statistical Methods:** PR: STA 2023 or STA 3032. Distribution-free tests on location and dispersion, goodness of fit tests, tests of independence, measures of association, nonparametric analysis of variance. *Occasional.*

**STA 4852 COS-STAT 3(3,0)**
**Applied Time Series:** PR: STA 4163. Forecasting methods, time series analysis, stationary and nonstationary time series, ARIMA models, forecasting processes. Occasional.