

INDUSTRIAL ENGINEERING (INEN)

INEN 1101 Introduction to Engineering 1 Credit

Department: College of Engineering

Students are introduced to five engineering disciplines: chemical, civil, electrical, industrial and mechanical. Student services such as the Career Center, Engineering Advisory Center and Engineering Cooperative Education Center are introduced. Study skills and strategies for a successful freshman year are discussed.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 2301 Applications of Quantitative Methods 3 Credits

Department: College of Engineering

Introduction and applications of differential calculus, probability and statistics, and linear algebra.

Prerequisite(s): MATH 1314

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 2360 Computer Applications in IE 3 Credits

Department: College of Engineering

This course introduces students to computer programming and spreadsheets from the industrial engineering point of view. Problems in application areas such as operations research, production planning and scheduling, quality and inventory control will be presented.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 2361 Career Development I 3 Credits

Department: College of Engineering

This course is intended for students employed full time in an engineering role. Students enrolled will work under a supervisor who will provide engineering assignments and performance feedback to the student. Students will apply concepts learned in their coursework to employer assigned problems. Students will practice working effectively in teams and or on individual projects. Students will practice communication skills through work site written and or oral communications and through a final written report to the course instructor.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 2370 Career Development II 3 Credits

Department: College of Engineering

This course is intended for students employed full time in an engineering role. Students enrolled will work under a supervisor who will provide engineering assignments and performance feedback to the student. Students will apply concepts learned in their coursework to employer assigned problems. Students are expected to solve engineering problems of an increasing complex nature as compared with problems solved in Career Development I. Students will practice working effectively in teams and or on individual projects. Students will practice communication skills through work site written and or oral communications and through a final written report to the course instructor.

Prerequisite(s): INEN 2361

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 2373 Engineering Economics 3 Credits

Department: College of Engineering

Introduction to economic principles, national income analysis, fluctuation and growth, time value of money, engineering project investment analysis, effect of taxes on engineering project decisions.

Prerequisite(s): MATH 2413

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 3300 Industrial Engineering-Intro 3 Credits

Department: College of Engineering

Introduction to Industrial Engineering, its tools and its techniques. Not open to students majoring in engineering.

Restriction(s):

Students cannot enroll who have a major in Chemical Engineering, Civil Engineering, Electrical Engineering, Industrial Engineering or Mechanical Engineering.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 3320 Probability and Statistics for Engineering 3 Credits

Department: College of Engineering

Probability definitions, sample spaces, condition probability, Bayes's Theorem, independence, random variables, discrete and continuous distributions, expectation and variance, and testing hypotheses.

Prerequisite(s): MATH 2413

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 3322 Engineering Materials and Manufacturing Processes 3 Credits

Department: College of Engineering

Basic principles underlying the behavior of engineering materials, methods and manufacturing processes. Machine tool process planning and operation, safety and quality. Introduction to digital programming of machine tools and robots.

Restriction(s):

Enrollment limited to students with a class of Junior, Post Baccalaureate or Senior.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 3323 Fundamentals of Manufacturing Processes 3 Credits

Department: College of Engineering

Basic principles underlying the behavior of engineering materials, methods and manufacturing processes. Machine tool process planning and operation, safety and quality. Not open to engineering students. For Industrial Technology students only.

Restriction(s):

Enrollment is limited to students with a major in Industrial Technology or Prov Industrial Technology.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 3330 Engineering Economy 3 Credits

Department: College of Engineering

Economics applied to the evaluation of engineering proposals. The effects of depreciation, taxation and interest rates. Not open to students majoring in engineering.

Prerequisite(s): MATH 1314 and INEN 2301

Restriction(s):

Students cannot enroll who have a major in Chemical Engineering, Civil Engineering, Electrical Engineering, Industrial Engineering or Mechanical Engineering.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 3360 Computer Technology 3 Credits

Department: College of Engineering

This course introduces Industrial Technology students to solving business problems with computer programming and spreadsheets. Not open to students majoring in engineering.

Prerequisite(s): MATH 1314

Restriction(s):

Students in the BS-BSIT program may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 3361 Career Development III 3 Credits

Department: College of Engineering

This course is intended for students employed full time in an engineering role. Students enrolled will work under a supervisor who will provide engineering assignments and performance feedback to the student. Students will apply concepts learned in their engineering coursework to engineering problems. Students are expected to solve engineering problems of an increasing complex nature as compared with problems solved in Career Development II. Students will practice working effectively in teams and or on individual projects. Students will practice communication skills through work site written and or oral communications and through a final written report to the course instructor.

Prerequisite(s): INEN 2370

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 3370 Career Development IV 3 Credits

Department: College of Engineering

This course is intended for students employed full time in an engineering role. Students enrolled will work under a supervisor who will provide engineering assignments and performance feedback to the student. Students will apply concepts learned in their engineering coursework to engineering problems. Students are expected to solve engineering problems of an increasing complex nature as compared with problems solved in Career Development III. Students will practice working effectively in teams and or on individual projects. Students will practice communication skills through work site written and or oral communications and through a final written report to the course instructor.

Prerequisite(s): INEN 3361

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 3380 Work Design 3 Credits

Department: College of Engineering

Determination of work content, workstation/facility layout, work methods, and times required for various occupational jobs/tasks. Design of tasks/jobs, workplace, and work environment to increase productivity, eliminate waste, and decrease occupational injury/illness.

Prerequisite(s): INEN 2360

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4300 Quality Improvement 3 Credits

Department: College of Engineering

Statistical methods and other industrial engineering analysis and design tools are used to control and improve quality and assure requirements are met.

Prerequisite(s): INEN 3320

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4301 Quality Control Applications 3 Credits

Department: College of Engineering

Quality assurance and the application of statistics to the control of quality. Control charts, acceptance sampling reliability and the role of standards in the quality function. Not open to students majoring in engineering.

Restriction(s):

Enrollment is limited to students with a major in Industrial Engineering.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4315 Industrial Management 3 Credits

Department: College of Engineering

Provides a foundation for becoming a manager in an industrial organization. Topics include leadership, strategic planning, culture change, human resources and ethics.

Restriction(s):

Enrollment limited to students with a class of Junior, Post Baccalaureate or Senior.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4316 Industrial and Product Safety 3 Credits

Department: College of Engineering

Principles of industrial accident prevention, accident statistics and costs, accident causation, appraising safety performance, recognizing industrial health and safety hazards, and recommending safeguards. Includes a study of mandatory and voluntary standards and product liability.

Prerequisite(s): INEN 3380

Restriction(s):

Enrollment limited to students with a class of Junior, Post Baccalaureate or Senior.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4320 Statistical Decision Making in Engineering 3 Credits**Department:** College of Engineering

Analysis of data to help the engineer/executive make decisions.

Evaluations of performance claims.

Prerequisite(s): INEN 3320**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4323 IE Systems Design 3 Credits****Department:** College of Engineering

This first semester of the senior capstone course is intended to draw on the knowledge and tools ascertained previously in the students' curriculum. This course requires students to identify and analyze industrial and systems engineering problems and to design of industrial engineering systems.

Prerequisite(s): INEN 3322 and INEN 3380 and INEN 4320 and INEN 2373 and MEEN 2302**Prerequisite(s)/Corequisite(s):** INEN 4375**Restriction(s):**Students with a class of Freshman, Junior or Sophomore may **not** enroll.

Enrollment is limited to students with a major in Industrial Engineering.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4331 Technology Entrepreneurship 3 Credits****Department:** College of Engineering

A project-based course focused on product design and emphasizing how engineers create value for new business ventures. Students will develop a mock startup company from idea to business model.

Restriction(s):Students with a class of Freshman or Sophomore may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4345 Computer Integrated Manufacturing 3 Credits****Department:** College of Engineering

Study of computer aided design and computer aided manufacturing to include geometric modeling in a 3D environment, analysis of engineering design problems, robotics, computer numerical control (CNC), and manufacturing control systems.

Prerequisite(s): INEN 3322**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4350 Production & Inventory Control 3 Credits****Department:** College of Engineering

Techniques for planning and controlling production and inventories. Modern materials requirements planning.

Prerequisite(s): PHYS 2426 and CVEN 2301 and INEN 2360 and INEN 2373**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4351 Production and Inventory Systems 3 Credits****Department:** College of Engineering

The design and operation of systems for managing production and inventories. Not open to students majoring in engineering.

Prerequisite(s): INEN 3301 or INEN 3300**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4354 Lean Manufacturing 3 Credits****Department:** College of Engineering

The planning, evaluation, deployment and integration of lean manufacturing theory and methods. Emphasis on manufacturing processes/equipment and systems.

Prerequisite(s): INEN 3380**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4357 Supply Chain Management 3 Credits****Department:** College of Engineering

A survey of supply chain management techniques and methods. Topics includes logistics, purchasing, inventory systems, demand management and supply chain visibility.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4360 Career Development V 3 Credits****Department:** College of Engineering

Offered: Other

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4363 Six Sigma 3 Credits****Department:** College of Engineering

Overview of the six sigma DMAIC methodology at the green belt level of competency with emphasis on process management.

Prerequisite(s): INEN 3380**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4369 Engineering Management 3 Credits****Department:** College of Engineering

Transition from engineering to management decision-making responsibilities. Topics include: leadership, proposal writing, negotiation, process/project management, and technology management.

Restriction(s):

Enrollment limited to students with a class of Senior.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4370 Operations Research 3 Credits****Department:** College of Engineering

An introduction to mathematical models of organizational systems. Topics covered include optimization (linear and integer programming), Markov chains, and queuing.

Prerequisite(s): MATH 3328 or MATH 2318**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 4375 Simulation of Industrial Systems 3 Credits****Department:** College of Engineering

Introduction to concepts of simulation modeling and analysis with application to manufacturing and service systems. Students will apply problem solving and process analysis techniques to an industrial engineering problem and propose an improved systems design.

Prerequisite(s): INEN 4320**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4376 Occupational Ergonomics 3 Credits

Department: College of Engineering

Application of ergonomics to the design and/or redesign of jobs, manufacturing workstations, and other work environments to achieve increased profitability and reductions in injury/illness.

Prerequisite(s): INEN 3380

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4380 Project Management 3 Credits

Department: College of Engineering

One of the main course objectives is to understand the fundamentals of project management to meet project objectives and customer expectations. Students will learn the unique terminology of project management. Basic tools and techniques of project management will be explored. Students will understand the important roles of project managers.

Restriction(s):

Students with a class of Freshman or Sophomore may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4381 Heuristic Algorithms 3 Credits

Department: College of Engineering

Heuristic Algorithms and applications to classical and real life problems. Justification and logic of heuristic algorithms. Greedy algorithms, Steepest Ascent, Numerical optimization, Simulated Annealing, Tabu Search, Cross entropy optimization. TSP, Set covering, Set partitioning.

Prerequisite(s): INEN 4370 and INEN 2360

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4385 IE Design 3 Credits

Department: College of Engineering

This senior capstone course is intended to draw on the knowledge and tools ascertained previously in the students' curriculum. This course prepares and guides students through real-world industrial engineering problems. Students design systems to solve problems typical of those encountered by practicing industrial engineers and entrepreneurs. Students typically work in teams to formulate issues, collect data, analyze data, design solutions, and communicate design solutions in formal and written presentations.

Prerequisite(s): INEN 4375 and INEN 4323

Restriction(s):

Enrollment is limited to students with a major in Industrial Engineering.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4394 Engineering Database Design 3 Credits

Department: College of Engineering

To provide students in engineering with knowledge about the design and implementation of engineering applications using database technology. Examples will be drawn from manufacturing and production systems.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4396 Automated System Engineering 3 Credits

Department: College of Engineering

To provide students in engineering with knowledge about the industrial automation and process control in the manufacturing industry: control system, PLC, sensor and actuator, auto-id, flexible manufacturing system, assembly line and automatic inspection.

Restriction(s):

Enrollment limited to students with a class of Graduate or Senior.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 4399 Special Topics 3 Credits

Department: College of Engineering

An investigation into specialized areas of industrial engineering under the guidance of a faculty member. This course may be repeated for a maximum of 12 credit hours, when topics of investigation differ.

May be Repeated for a maximum of 12 hours

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5101 Special Topics 1 Credit

Department: College of Engineering

An investigation into specialized study in advanced areas of engineering under guidance of a faculty member. This course may be repeated for credit when topics of investigation differ.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5301 Special Topics 3 Credits

Department: College of Engineering

An investigation into specialized study in advanced areas of engineering under guidance of a faculty member. This course may be repeated for credit when topics of investigation differ.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5302 Introduction to Port Management 3 Credits

Department: College of Engineering

This course will provide an overview of all aspects and considerations involved in the management of port authorities and marine terminals across the wide array of publicly and privately owned and operated facilities. The course will also address governance and organizational structure options and implications.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5304 Risk Management and Decision Making 3 Credits**Department:** College of Engineering

The course provides an overall decision analysis paradigm and a set of tools - primarily decision-tree analysis and Monte Carlo simulation - to construct and facilitate decision making. A variety of exercises, problems, and case studies, analytical modeling, data analysis and optimization will be utilized to facilitate logical, strategic and tactical choices in data- and time-constrained management environments.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5305 Reliability 3 Credits****Department:** College of Engineering

Statistical theories pertinent to solution of engineering problems in reliability; distribution and failure theory including failure rate and mean time to failure for the exponential, log normal, gamma and Weibull distributions.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5306 Freight Transportation Logistics 3 Credits****Department:** College of Engineering

A course covering quantitative models (optimization, queuing, and simulation) for ports and international logistics. The class will study container, RORO, bulk and tanker port modeling.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5307 Capital Projects 3 Credits****Department:** College of Engineering

Economic analysis of capital investments in large scale infrastructure. Topics include planning, budgeting, justification, analysis, and funding strategies. Techniques include time value of money, rates of return, depreciation, cost estimation, benefit cost analysis, capital allocation, simulation and decision making under uncertainty.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5308 Port Security and Resiliency Planning 3 Credits****Department:** College of Engineering

Principles of industrial accident prevention, accident statistics and costs, accident causation, appraising safety performance, recognizing port/terminal health, safety, environmental and security hazards and recommending safeguards. Includes a study of mandatory, recommended and voluntary standards.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5309 Strategic and Facility Master Planning 3 Credits****Department:** College of Engineering

To provide the student with the knowledge of how to manage the port estate.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5310 Marine Terminal Operations 3 Credits****Department:** College of Engineering

Port and maritime terminals will be analyzed and new requirements for terminal operating capacities will be introduced to better grasp changing port environments in this class. These analyses are the basis for port engineering design and development. In addition, SEELS (The Scalable End-to-End Logistic Simulation) port operation software will be introduced as port management tool. This software was specifically designed to create specific port operations and allows users to create what-if analysis.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5312 Quality Improvement 3 Credits****Department:** College of Engineering

Statistical methods and other Industrial Engineering analysis and design tools are used to control and improve quality and assure requirements are met.

Prerequisite(s): INEN 3320**Restriction(s):**

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5316 Industrial Management 3 Credits

Department: College of Engineering

Provides a foundation for becoming a manager in an industrial organization. Topics include: Strategic planning, culture change, organizational analysis and technology management. Students will apply decision making methodologies to hypothetical situations.

Prerequisite(s): INEN 3320

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5320 Stat Decision Making 3 Credits

Department: College of Engineering

Analysis of data to help the engineer/executive make decisions. Evaluations of performance claims, probability distributions, hypothesis testing, ANOV, design of experiments.

Prerequisite(s): INEN 3320

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5321 Quality Control Systems 3 Credits

Department: College of Engineering

Application of statistical methods to industrial problems; regression and correlation theory; analysis of variance; use of control charts for control of manufacturing operations.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5331 Technology Entrepreneurship 3 Credits

Department: College of Engineering

A project-based course focused on product design and emphasizing how engineers create value for new business ventures. Students will develop a mock startup company from idea to business model.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5333 Operations Research II 3 Credits

Department: College of Engineering

Advanced topics in operations research-linear programming, non-linear programming, advanced topics in queuing and inventory theories, sensitivity analysis and dynamic programming.

Prerequisite(s): INEN 5370

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5339 Material Science & Mfg Process 3 Credits

Department: College of Engineering

Basic principles underlying the behavior of engineering materials and methods of processing these materials.

Prerequisite(s): INEN 3322 and CHEM 1411

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5345 Comp Integrated Manufacturing 3 Credits

Department: College of Engineering

Advanced concepts in computer aided design and manufacturing to include geometric modeling in a 3D solids environment, analysis of engineering design problems, robotics, computer numerical control, and manufacturing control systems. Course includes a design project.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5350 Prod & Invent Control 3 Credits

Department: College of Engineering

Techniques for planning and controlling production and inventories. Forecasting, aggregate planning, materials requirements planning, scheduling, project management.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5353 Manufacturing Analysis 3 Credits**Department:** College of Engineering

Theoretical and practical consideration in conventional and emerging manufacturing processes including machining, heat treating, electrical discharge machining, electrical chemical machining, laser machining, rapid prototyping, micro-machining, and environment conscious manufacturing.

Prerequisite(s): INEN 3322**Restriction(s):**

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5354 Lean Manufacturing 3 Credits****Department:** College of Engineering

Introduction and overview of the Lean Manufacturing techniques. Topics include, but are not limited to, lean system, lean system standards, manufacturing system design, manufacturing cell design, 5S, visual management.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5357 Supply Chain Management 3 Credits****Department:** College of Engineering

A comprehensive review of supply chain management techniques and methods to improve efficiency, synchronization, customization and innovation. Topics include logistics, network design and operation.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5358 Intro Robotics 3 Credits****Department:** College of Engineering

This course introduces students to robotics theory, sensors and actuators, kinematics and dynamics, path planning and algorithms for robotics.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5363 Six Sigma 3 Credits****Department:** College of Engineering

Overview of the six sigma DMAIC methodology at green belt level of competency with emphasis on process management.

Prerequisite(s): INEN 3380**Restriction(s):**

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5369 Engineering Management 3 Credits****Department:** College of Engineering

This course is designed to prepare engineering students to gain necessary management skills to lead technical organizations in a globally challenged environment. topics include, but are not limited to, management techniques from past to present, engineering manager skills, environment and sustainability, globalization and social responsibilities, diversity issues in corporate US, planning, controlling, leading and organizing tools and techniques, decision-making, ethics in the workplace and teams and teamwork.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5370 Operations Research 3 Credits****Department:** College of Engineering

An introduction to the construction of mathematical models for organizational systems to aid executives in making decisions. Linear programming, network flow programming, dynamic programming, queuing theory.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**INEN 5374 Human Factors Engineering 3 Credits****Department:** College of Engineering

Convey human factors considerations in design and research. Applications include control panels, audio and video displays, computer work stations, special accommodations.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5375 Simulation of IE Systems 3 Credits

Department: College of Engineering

Introduction to concepts of simulation modeling and analysis with application to manufacturing and service systems. Students will apply problem solving and process analysis techniques to an industrial engineering problem and propose an improved systems design.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5376 Occup Ergonomics 3 Credits

Department: College of Engineering

Application of ergonomics to the design and/or redesign of jobs, manufacturing workstations, and other work environments to achieve increased profitability and reductions in injury/illness.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5380 Project Management 3 Credits

Department: College of Engineering

One of the main course objectives is to understand the fundamentals of project management to meet project objectives and customer expectations. Students will learn the unique terminology of project management. Basic tools and techniques of project management will be explored. Students will understand the important roles of project managers.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5381 Heuristic Algorithms 3 Credits

Department: College of Engineering

Heuristic Algorithms and applications to classical and real life problems. Justification and logic of heuristic algorithms. Greedy algorithms, Steepest Ascent, Numerical optimization, Simulated Annealing, Taboo Search, Cross entropy optimization, TSP, Set covering, Set partitioning.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5382 Enterprise Bus Intelligence 3 Credits

Department: College of Engineering

This course introduces students to data mining focusing on business enterprise data. Major topics covered are data integration, data cleaning, classification algorithms, clustering, regression and neural networks.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5394 Engineering Database Design 3 Credits

Department: College of Engineering

To provide students in engineering with knowledge about the design and implementation of engineering applications using database technology. Examples will be drawn from manufacturing and production systems. It is assumed that students have had a programming course and are familiar with fundamental programming constructs. Visual Basic for Application is used in this course.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 5396 Automated System Engineering 3 Credits

Department: College of Engineering

To provide students in engineering with knowledge about the industrial automation and process control in the manufacturing industry: control system, PLC, sensor and actuator, auto-id, flexible manufacturing system, assembly line and automatic inspection.

Restriction(s):

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 6110 Professional Seminar 1 Credit

Department: College of Engineering

Advanced topics suitable for research along with research procedures will be discussed. Field study organization and content together with doctoral research problems and progress will be represented. Topics will vary each semester and course may be repeated for credit. Registration and completion for three semesters is required of all doctoral candidates.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

INEN 6301 Special Topics (Titles my vary) 3 Credits

Department: College of Engineering

An investigation into specialized study in advanced areas of engineering under guidance of a faculty member. This course may be repeated for credit when topics of investigation differ.

May be Repeated for a maximum of 3 hours

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS