TMAE Applied Engineering

TMAE 5131 Essentials of Applied Mechanical Engineering
3 Credit Hours. 2 Lecture Hours. 3 Lab Hours.
This is a course for students with no mechanical engineering experience. The principles of engineering mechanics are developed from a work/energy point of view. Survey topics include a review of the fundamentals of mechanics, elastic behavior of materials, stress-strain relationships and measurements, elasticity theory, stability, dynamics, and vibration theory. Prerequisite(s): Permission of Instructor.
Cross Listing(s): TMAE 5131G.

TMAE 5131G Essentials of Applied Mechanical Engineering
3 Credit Hours. 2 Lecture Hours. 3 Lab Hours.
This is a course for students with no mechanical engineering experience. The principles of engineering mechanics are developed from a work/energy point of view. Survey topics include a review of the fundamentals of mechanics, elastic behavior of materials, stress-strain relationships and measurements, elasticity theory, stability, dynamics, and vibration theory. Graduate students will be required to complete a case study or other individualized advanced activity that undergraduate students will not be required to complete.
Prerequisite(s): Permission of department (should not be taken by graduate students with a B.S. in Mechanical Engineering).
Cross Listing(s): TMAE 5131.

TMAE 5132 Essentials of Applied Electrical Engineering
3 Credit Hours. 2 Lecture Hours. 3 Lab Hours.
This is a course for students with no electrical engineering experience. Survey topics include electrical energy sources, DC circuits, resistive networks, network theorems, inductance, capacitance, natural step responses of RL, RC, and RLC circuit, sinusoidal steady state analysis, Three-phase circuits, computer circuit analysis, non-linear, active components such as diodes, transistors (both bipolar and MOSFET), and operational amplifiers. Prerequisite(s): Permission of Instructor.
Cross Listing(s): TMAE 5132G.

TMAE 5132G Essentials of Applied Electrical Engineering
3 Credit Hours. 2 Lecture Hours. 3 Lab Hours.
This is a course for students with no electrical engineering experience. Survey topics include electrical energy sources, DC circuits, resistive networks, network theorems, inductance, capacitance, natural step responses of RL, RC, and RLC circuit, sinusoidal steady state analysis, Three-phase circuits, computer circuit analysis, non-linear, active components such as diodes, transistors (both bipolar and MOSFET), and operational amplifiers. Graduate students will be required to complete a case study or other individualized advanced activity that undergraduate students will not be required to complete.
Prerequisite(s): Permission of department (should not be taken by graduate students with a B.S. in Electrical Engineering).
Cross Listing(s): TMAE 5132.

TMAE 5133 Production Planning and Facilities Design
3 Credit Hours. 3 Lecture Hours. 1 Lab Hour.
The methods used to plan and control the efficient and effective use of equipment, tooling, people, materials, and other resources to manufacture products. This will lead to the examination of the fundamental theories, practices, and methods for the design of manufacturing and service facilities to enable productive flow of goods and services. Emphasis is placed on applied exercises utilizing spreadsheet and CAD software that culminates in a semester project. Prerequisite(s): MENG 3333 or Permission of Instructor.
Cross Listing(s): TMAE 5133G.

TMAE 5133G Production Planning and Facilities Design
3 Credit Hours. 3 Lecture Hours. 1 Lab Hour.
The methods used to plan and control the efficient and effective use of equipment, tooling, people, materials, and other resources to manufacture products. This will lead to the examination of the fundamental theories, practices, and methods for the design of manufacturing and service facilities to enable productive flow of goods and services. Emphasis is placed on applied exercises utilizing spreadsheet and CAD software that culminates in a semester project. Graduate students will be required to complete a case study, or research project not required of undergraduate students.
Prerequisite(s): MENG 3333 or permission of department.
Cross Listing(s): TMAE 5133.

TMAE 5134 Lean World Class Manufacturing
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A comprehensive study of Lean Manufacturing Engineering technology and systems. Topics include key customer-focused, waste-reducing elements of Just-In-Time Production, Total Quality Control, Total Productive Maintenance, and Total Employee Involvement. Traditional manufacturing methods are contrasted with modern lean methods and the tools that facilitate their implementation. Students will study real world examples including quick-change tool designs, kanban systems, and factory layout conversions. Prerequisite(s): A minimum grade of "C" in MENG 3333 or MFGE 3531.
Cross Listing(s): TMAE 5134G.

TMAE 5134G Lean World Class Manufacturing
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A comprehensive study of Lean Manufacturing Engineering technology and systems. Topics include key customer-focused, waste-reducing elements of Just-In-Time Production, Total Quality Control, Total Productive Maintenance, and Total Employee Involvement. Traditional manufacturing methods are contrasted with modern lean methods and the tools that facilitate their implementation. Students will study real world examples including quick-change tool designs, kanban systems, and factory layout conversions. Graduate students will be required to complete individual advanced level research in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor. Prerequisite(s): A minimum grade of "C" in MENG 3333 and MFGE 3531 or permission of department.
Cross Listing(s): TMAE 5134.

TMAE 5139 Renewable Energy
3 Credit Hours. 0,2 Lecture Hours. 0,2 Lab Hours.
The design, operation, and environmental and socio-economic impact of renewable energy systems will be presented with an engineering emphasis. Additionally, cycle evaluation and analysis of the renewable energy systems, the efficiency and power output of renewable energy systems, their benefits and costs will be determined. Graduate students will be required to complete an additional design project that involves a class presentation with a more advanced technical analysis. Prerequisite(s): A minimum grade of "C" in MENG 3233 or permission of instructor.
Cross Listing(s): TMAE 5139G, MENG 5139, MENG 5139G.

TMAE 5139G Renewable Energy
3 Credit Hours. 0,2 Lecture Hours. 0,2 Lab Hours.
The design, operation, and environmental and socio-economic impact of renewable energy systems will be presented with an engineering emphasis. Additionally, cycle evaluation and analysis of the renewable energy systems, the efficiency and power output of renewable energy systems, their benefits and costs will be determined. Graduate students will be required to complete an additional design project that involves a class presentation with a more advanced technical analysis. Prerequisite(s): A minimum grade of "C" in MENG 3233 or permission of department.
Cross Listing(s): TMAE 5139, MENG 5139, MENG 5139G.
TMAE 5890 Selected Topics in Applied Engineering
1-3 Credit Hours. 1-3 Lecture Hours. 0-2 Lab Hours.
This course is scheduled on an infrequent basis to explore special areas in applied engineering.
Prerequisite(s): Permission of Instructor.
Cross Listing(s): TMAE 5890G.

TMAE 5890G Selected Topics in Applied Engineering
1-3 Credit Hours. 1-3 Lecture Hours. 0-2 Lab Hours.
This course is scheduled on an infrequent basis to explore special areas in applied engineering. Graduate students will be required to complete a case study or research project not required of undergraduate students.
Prerequisite(s): Permission of department.
Cross Listing(s): TMAE 5890.

TMAE 7136 Mechatronics I
3 Credit Hours. 2 Lecture Hours. 3 Lab Hours.
This course is designed to build a working familiarity with the electronics and techniques needed in the design and control of electro-mechanical systems. The topics in this course include integrated use of mechanical, electrical, and computer systems for control of machines and devices, system modeling, sensors and actuators, basic electronics design, signal processing, grounding, and interfacing techniques.
Prerequisite(s): TMAE 5131 or TMAE 5132 or permission of department.
Cross Listing(s): MENG 7136.

TMAE 7137 Mechatronics II
3 Credit Hours. 2 Lecture Hours. 3 Lab Hours.
This course is designed to provide further fundamental information to understand the fusion of mechanical engineering, electrical engineering, and computer data acquisition/programming and their relationship to the field of Mechatronics. This course emphasizes the interfacing of microcomputers with sensors and actuators, hybrid (analog/digital) design, digital logic and analog circuitry, microcomputer architecture, assembly language programming, signal conditioning, filters, analog-to-digital and digital-to-analog conversion, and the interface of data acquisition systems with the control process.
Prerequisite(s): A minimum grade of "C" in TMAE 7136 or permission of department.
Cross Listing(s): MENG 7138.

TMAE 7237 Mathematical Control Theory
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
State-space techniques from modern control system theory. Topics include realization theory for MIMO systems, state-space techniques for feedback control, closed-loop observer design, and state-space techniques in optimal control.
Prerequisite(s): A minimum grade of "C" in MATH 3230 and MATH 5336G.

TMAE 7330 Advanced Electromagnetics
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course introduces fundamental concepts of wave propagation, polarization, radiation from sources, guided waves, transmission lines, smith charts, and numerical calculation techniques such as Finite-Difference Time-Domain (FDTD) method. The course includes research project activities.
Prerequisite(s): A minimum grade of "C" in EENG 3230 or Permission of Instructor.

TMAE 7331 Advanced Digital Signal Processing
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course discusses advanced topics in digital signal processing such as implementation of discrete-time systems, design of FIR/IIR digital filters, sampling and reconstruction of signals, multi-rate digital signal processing, linear prediction and optimum linear filters, and power spectrum estimation.
Prerequisite(s): A minimum grade of "C" in ENGR 2341 or Permission of Instructor.

TMAE 7332 Digital Control Systems
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An understanding of the elements of digital control theory will be developed. Students will be introduced to discrete system modeling, sampled data systems, z-transforms, state-space system representation and discrete control designs. Advance topics include Neural Networks and Fuzzy Logic application to control and the use of software tools that can be used to design and analyze this kind of systems. Students will also develop practical applications of digital control systems.
Prerequisite(s): A minimum grade of "C" in EENG 5431 or MENG 5536 or Permission of Instructor.

TMAE 7430 Industrial Case Study Analysis
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
The systems approach and case study format are utilized for the resolution of current technical management problems of various industries. Problem solving methods are presented, discussed, and utilized in student activities.

TMAE 7431 Advanced Quality Control
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A study of modern philosophies, methodologies, and technologies for quality control and improvement with emphasis on total quality management, statistical process control, quality improvement methods, and acceptance sampling.

TMAE 7432 Advanced Engineering Economy
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Consideration of probability and risk effects on estimates, selection of the minimum, attractive rate of return, capitol rationing among competing projects, and economic analysis in government.

TMAE 7433 Facilities Planning
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An organized approach for planning a facility that achieves facilities location and design objectives, including how the activity's tangible assets best support achieving the activity's objectives. It is a composite of facilities location and facilities design with the approach based on the engineering design process. Techniques can be applied equally for non-manufacturing applications.

TMAE 7434 Product Lifecycle Analysis
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course will provide a holistic overview of the product lifecycle starting with idea conceptualization and ending with environment conscious product disposal. The cradle to grave design concept will be emphasized throughout this course. A related area of emphasis will be product demand forecasting and facilities design. Several aspects such as design review, Quality Function Deployment, trend extrapolation, statistical techniques, product functionality and usability will also be included.
Prerequisite(s): A minimum grade of "C" in TMAE 7431.

TMAE 7435 Manufacturing Systems Analysis
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A study of the analysis of manufacturing systems, systems analysis and problem solving in manufacturing. The tools of systems analysis will be used to formulate the real problems of manufacturing, identify where computer systems can help, and solve challenging manufacturing systems problems.

TMAE 7530 Research in Applied Engineering
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A study of modern research methods and their application to the preparation of the thesis and technical reports.
Cross Listing(s): MENG 7530.
TMAE 7531 Technical Management and Leadership
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A study in the application of modern technical management and leadership principles in the Engineering and Information Technology disciplines. The course focuses on the process of obtaining, deploying, and utilizing a variety of essential resources that contribute to the effective and efficient operation of technical organizations in dynamic and competitive environments.

TMAE 7532 Global Technology
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An examination of the developments in engineering, technology, and industry worldwide and the effects upon international relations.

TMAE 7890 Selected Topics in Applied Engineering
1-3 Credit Hours. 1-3 Lecture Hours. 0-2 Lab Hours.
This course is scheduled on an infrequent basis to explore special areas of applied engineering.
Cross Listing(s): TMAE 7890.

TMAE 7891 Independent Study
1-3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
Independent study is available for students to undertake individualized experimentation, research, study related to applied engineering, or a capstone project. The specific topic will be approved by a faculty member in the program, and credit will be assigned commensurate with the magnitude of the study.
Cross Listing(s): MENG 7891.

TMAE 7895 Special Problems in Applied Engineering
1-3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
Individual and specialized study in the areas of applied engineering not otherwise covered in the program. Students must submit a proposal of the special problem for approval by the faculty member of record. Credit will be assigned commensurate with the magnitude of the study.
Cross Listing(s): MENG 7895.

TMAE 7999 Thesis
1-6 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
This course focuses on the preparation and completion of the thesis.