

Mechanical Engineering Technology

Associate in Applied Science Degree

The Mechanical Engineering Technology program is a two-year career-oriented curriculum preparing students for positions as engineering technicians in the design, production and testing of machines, tools and manufactured products. Job activities center on technical problem solving and the practical application of engineering knowledge.

The program educational objectives of the Mechanical Engineering Technology program are to:

- Produce graduates who are employed and operate effectively in positions that lie between those of the skilled craftsperson and those of the graduate mechanical engineer, including such positions as mechanical designer, engineering technician, quality assurance technician, manufacturing engineering technician and technical sales.
- Produce graduates who can successfully transfer and complete a baccalaureate degree program in mechanical engineering technology.

A student in this program will have met the following outcomes at the time of their graduation:

- An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well-defined engineering problems appropriate to the discipline;
- An ability to design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;
- An ability to apply written, oral, and graphical communication in well-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature
- An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results; and
- An ability to function effectively as a member of a technical team.

After obtaining an Associate in Applied Science degree, it is possible to continue at a four-year college and to complete a Bachelor of Science degree in Engineering Technology. No prior mechanical design experience is necessary to enter the Mechanical Engineering Technology program. Core technology courses are sequenced along with applied mathematics and science to develop a broad background in the field of mechanical technology. Each engineering technology course contains a laboratory, which utilizes modern test instruments and applies classroom theory to practical applications. Cooperative Education, a work-study program with local firms, is available. The Mechanical Engineering Technology program is accredited by the Engineering Technology Accreditation

Commission of ABET, www.abet.org. You can find out more at the ABET (<http://www.abet.org>) (www.abet.org) website.

Articulation Agreements

An existing agreement with New Jersey Institute of Technology (NJIT) provides students in this program with a local transfer opportunity. Students should check with the Transfer Office about other articulation agreements with this program.

For more information, visit the [Mechanical Engineering Technology](https://www.ccm.edu/academics/divdep/bmet/department-of-engineering-technologies-and-engineering-science/mechanical-engineering-technology/) (<https://www.ccm.edu/academics/divdep/bmet/department-of-engineering-technologies-and-engineering-science/mechanical-engineering-technology/>) website.

Degrees

AAS Mechanical Engineering Technology

(P3700)

General Education Foundation

| | | |
|---|------------------------|----|
| Communication | | 6 |
| ENG-111 | English Composition I | |
| ENG-112 | English Composition II | |
| Math-Science-Technology | | 3 |
| CMP-128 | Computer Science I | |
| Social Science or Humanities | | 3 |
| The course must meet both the General Education and Diversity requirements. | | |
| General Education | | 8 |
| Math Elective ¹ | | |
| General Education Foundation Credits | | 20 |

Mechanical Engineering Core

| | | |
|---------|--|---|
| ENR-132 | Introduction to Experimentation and Design | 3 |
| ENR-117 | Computer-Aided Drafting I | 2 |
| ENR-118 | Computer-Aided Drafting II | 2 |
| ENR-240 | Engineering Technology Project | 3 |
| MEC-104 | Statics | 3 |
| MEC-109 | Manufacturing Process for Engineering Technology | 4 |
| MEC-110 | Materials for Engineering Technology | 4 |
| MEC-141 | Strength of Materials for Engineering Technology | 3 |
| MEC-204 | Dynamics for Technology | 2 |
| MEC-209 | Introduction to Advanced Manufacturing And CNC Programming (Or) | 3 |
| MEC-229 | Cooperative Work Experience-Mechanical Engineering Technology (Or) | |
| ELT-250 | Solar Photovoltaic and Alternative Energy Systems | |
| ELT-100 | Circuit Analysis DC/AC | 3 |
| PHY-111 | Technical Physics I | 4 |
| PHY-112 | Technical Physics II | 4 |

| | |
|-------------------------------------|-----------|
| Mechanical Engineering Core Credits | 40 |
| Total Credits | 60 |

¹ Course selected can be any 4-credit math course except for MAT-120

Certificates

Computer-Aided Drafting Technology Certificate

(P5710)

All manufacturing industry, research and development organizations, and design divisions of major corporations use drafters in the preparation of various stages of formal drawings. Typically companies that hire engineers, architects or designers have a need for people skilled in drafting.

This certificate program is designed to prepare students for entry-level positions as junior drafters, drafter trainees or drafters using computer-aided drafting (CAD). The supportive technical course work in manufacturing, materials, science, mathematics and writing assists students in continuing to advance their careers and strengthens the background of those desiring to continue their education.

Normally, students complete 29 hours of credit course work and 3 hours of non-credit mathematics to earn the certificate. However, students with strong backgrounds in mathematics may elect to take a credit course, MAT-110 College Algebra, in place of the non-credit MAT-016 Intermediate Algebra course with the approval of their academic advisor. Depending on the courses taken, students who successfully complete this program may receive one semester or more of credit toward a Mechanical Engineering Technology degree.

| | | |
|--|--|----|
| Communications | | |
| ENG-111 | English Composition I | 3 |
| Mathematics and Science | | |
| Select one math and one physics from the following: ¹ | | 7 |
| | | or |
| | | 8 |
| MAT-110 | College Algebra (3 CR) | |
| | or MAT-124 Statistics | |
| | or MAT-130 Probability and Statistics | |
| PHY-103 | Concepts of Physics (4 CR) ¹ | |
| | or PHY-111 Technical Physics I | |
| Specialized Courses | | |
| CMP-135 | Computer Concepts With Applications | 3 |
| | or CMP-126 Computer Technology and Applications | |
| ENR-117 | Computer-Aided Drafting I | 2 |
| ENR-118 | Computer-Aided Drafting II | 2 |
| MEC-109 | Manufacturing Process for Engineering Technology | 4 |
| ENR-132 | Introduction to Experimentation and Design | 3 |
| MEC-110 | Materials for Engineering Technology | 4 |
| ELT-210 | Electronic Fabrication | 1 |

| | |
|---------------------------------|--------------|
| Technical Elective ² | 1-4 |
| Total Credits | 30-34 |

¹ Students should consult their academic advisors when selecting these courses.

² Technical Elective are courses that start with any of the following Department Prefixes: ENR, ELT or MEC. ELT-123 is not acceptable as a technical elective for this certificate.

Certificates of Achievement

- [Advanced Mechanical Analysis - A Certificate of Achievement within Mechanical Engineering Technology \(p. 2\)](#)
- [Assembly and Testing - A Certificate of Achievement within Mechanical Engineering Technology \(p. 2\)](#)
- [Engineering Technology - A Certificate of Achievement within Mechanical Engineering Technology \(p. 3\)](#)
- [Mechanical CAD - A Certificate of Achievement within Mechanical Engineering Technology \(p. 3\)](#)

Advanced Mechanical Analysis

A Certificate of Achievement within Mechanical Engineering Technology

(P0635)

The Advanced Mechanical Analysis Certificate is designed for present or future professionals who seek to improve their technical knowledge and skills in certain areas. The certificate is balanced with theory and hands-on experience. This certificate provides an advanced introduction to theories and techniques used in mechanical and structural analysis. It's possible to complete the certificate within a year and the courses fully transfer to the AAS degree in Mechanical Engineering Technology.

| | | |
|----------------------|--|-----------|
| MAT-110 | College Algebra | 3 |
| MAT-123 | Precalculus | 4 |
| MEC-104 | Statics | 3 |
| MEC-141 | Strength of Materials for Engineering Technology | 3 |
| MEC-204 | Dynamics for Technology | 2 |
| Total Credits | | 15 |

Assembly and Testing

A Certificate of Achievement within Mechanical Engineering Technology

(P0627)

The Assembly and Testing Certificate of Achievement is designed for present or future professionals who seek to improve their technical knowledge and skills in certain areas. The certificate is balanced with theory and hands-on experience. This certificate provides an introduction to applications used in the assembly and testing of electronic equipment. It's possible to complete the certificate within a year and the courses fully transfer to the AAS degree in Electronics Engineering Technology.

| | | |
|---------|--|---|
| ENR-117 | Computer-Aided Drafting I | 2 |
| ELT-110 | Digital Principles | 3 |
| ENR-132 | Introduction to Experimentation and Design | 3 |
| ELT-210 | Electronic Fabrication | 1 |
| MAT-016 | Intermediate Algebra (or test into a higher level N3 Math class) | |

Total Credits 9

Engineering Technology

A Certificate of Achievement within Mechanical Engineering Technology

(P0633)

The Engineering Technology Certificate of Achievement is designed for present or future professionals who seek to improve their technical knowledge and skills in certain areas. The certificate is balanced with theory and hands-on experience. This certificate provides a strong foundation in both electronic and mechanical theories and applications. It's possible to complete the certificate within a year and the courses fully transfer to the Electronics Engineering Technology and Mechanical Engineering Technology degrees.

Required Core Courses

| | | |
|-------------------------------|--|---|
| ENR-117 | Computer-Aided Drafting I | 2 |
| ENR-132 | Introduction to Experimentation and Design | 3 |
| Required Core Courses Credits | | 5 |

Electives

Select 9 credits from the following 9

| | | |
|---------|--|--|
| ENR-118 | Computer-Aided Drafting II | |
| MEC-110 | Materials for Engineering Technology | |
| ELT-110 | Digital Principles | |
| MEC-109 | Manufacturing Process for Engineering Technology | |
| ELT-115 | Active Circuit Components | |
| ELT-201 | Electricity and Electronics | |
| ELT-210 | Electronic Fabrication | |
| MEC-209 | Introduction to Advanced Manufacturing And CNC Programming | |

Electives Credits 9

Total Credits 14

Mechanical CAD

A Certificate of Achievement within Mechanical Engineering Technology

(P0625)

The Mechanical CAD Certificate of Achievement is designed for present or future professionals who seek to improve their technical knowledge and skills in certain areas. The certificate is balanced with theory and hands-on experience. This certificate provides a strong foundation in Computer Aided Drafting (CAD) and in manufacturing techniques. It's possible to complete the certificate

within a year and the courses fully transfer to the CAD Certificate or the AAS degree in Mechanical Engineering Technology.

| | | |
|---------|--|---|
| ENR-117 | Computer-Aided Drafting I | 2 |
| ENR-118 | Computer-Aided Drafting II | 2 |
| MEC-109 | Manufacturing Process for Engineering Technology | 4 |

Credits 8

Technical Elective

Choose from the following

| | | |
|---------|--------------------------------------|----|
| CMP-126 | Computer Technology and Applications | 3 |
| | | or |
| | | 4 |

or CMP-135 Computer Concepts With Applications

or ENR-132 Introduction to Experimentation and Design

Choose from the following Credits 3-4

Total Credits 11-12

Faculty

Thomas Roskop

Chairperson, Engineering Technologies/Engineering Science
Associate Professor, Engineering Science and Mechanical Engineering Technology

M.E., Stevens Institute of Technology

B.E., Stevens Institute of Technology

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Joshua Denholtz

Instructor, Engineering Technologies

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Dr. Zahra Khalkhali

Assistant Professor, Engineering Science and Mechanical Engineering Technology

Ph.D., University of Massachusetts Amherst

M.S., Iran University of Science and Technology

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Yusuf Dag

Assistant Professor, Engineering Science and Mechanical Engineering Technology

Ph.D. (ABD), New Jersey Institute of Technology

M.E., Southern University A&M College

B.S., Sakarya University

AME 119 973-328-5544 ydag@ccm.edu

Courses

ENR-103. Basic Engineering Graphics I. 1 Credit.

LAB 3 hrs

Students learn fundamentals of engineering drawing through freehand sketching. Course includes developing orthographic views including auxiliary views, dimensioning, sectioning, tolerancing, threads, fasteners, springs and assembly drawings. Course includes creation of pictorial drawings.

ENR-117. Computer-Aided Drafting I. 2 Credits.

LECT 1 hr LAB 4 hrs

This course is an introduction to the concepts and operation of engineering drawing preparation using CAD (computer-aided drafting). The emphasis is on how CAD can reduce drawing time and improve accuracy. Students learn to use the AutoCAD software program to prepare drawings.

Additional Fees: Course fee applies.**ENR-118. Computer-Aided Drafting II. 2 Credits.**

LECT 1 hr LAB 4 hrs

This course is a continuation and enhancement of Computer-Aided Drafting I. Topics include prototype drawings, blocks, attributes, x-reference, grips, paper space and development of 3-dimensional solid modeling.

Prerequisites: ENR-117 or ENR-121**Additional Fees:** Course fee applies.**ENR-119. Technical Computer Applications. 1 Credit.**

LAB 3 hrs

This course provides an introduction to the various technical tools available to help solve problems in the field of engineering technology. This is a hands-on laboratory course designed to provide students with experience in using scientific calculators, Windows Operating System, Microsoft Office and Internet search tools. Special emphasis is placed on the development of technical reports using Microsoft Office's EXCEL and Word programs.

Prerequisites: MAT-007 or equivalent**Additional Fees:** Course fee applies.**ENR-120. Technical Computer Programming. 2 Credits.**

LECT 2 hrs LAB 2 hrs

This course is an introduction to computer programming with application to engineering technology. Microcomputers are used to develop application programs in a programming language.

Prerequisites: MAT-007 or equivalent**Additional Fees:** Course fee applies.**ENR-121. Engineering Graphics. 2 Credits.**

LECT 1 hr LAB 3 hrs

This course is an introduction to computer aided design software and hardware. Covered are geometric constructions, multiview orthographic projection, dimensioning, sectioning, auxiliary view and axonometric projection and principles of descriptive geometry. A brief introduction to solid modeling is also included. This course is intended for Engineering Science students; Engineering Technology students take ENR-117.

Prerequisites: MAT-123**Additional Fees:** Course fee applies.**ENR-123. Introduction to Engineering. 0 Credits.**

LECT 1 hr

This course provides the entering engineering student with an overview of the engineering profession and the design process. Topics discussed include the engineering course of study, academic advisement and transfer processes, types of engineering disciplines, problem-solving techniques, typical software tools, reporting techniques, and study skills.

ENR-124. Instrumentation and Measurements. 2 Credits.

LECT 1 hr LAB 3 hrs

This course is an introductory study in the concepts involving physical measurements utilizing hands-on electrical and mechanical measurement applications. Use of basic instruments and transducers, accuracy and precision, units and standards of measurements, accounting and presentation of errors in measurements.

Prerequisites: MAT-007 or equivalent**Corequisites:** ENR-119**Additional Fees:** Course fee applies.**ENR-125. Computer Programming for Engineers. 3 Credits.**

LECT 2 hrs LAB 2 hrs

A course in structured and object-oriented programming, emphasizing engineering applications and numerical methods in assignments. Program assignments are coded and are implemented on personal computers.

Prerequisites: MAT-123**Additional Fees:** Course fee applies.**ENR-126. Computer Aided Design and Applications. 2 Credits.**

LECT 1 hr LAB 4 hrs

An introductory course in computer aided design using parametric solid modeling software. Creation of solid models of parts, generation of orthographic views, sectional views and auxiliary views are covered. Dimensioning and tolerancing of parts is emphasized along with development of appropriate files to make the parts for product development using rapid prototyping (3-D printing) and to manufacture parts using computerized numerical control machines.

Prerequisites: ENR-117**Additional Fees:** Course fee applies.**ENR-130. Introduction to Engineering. 1 Credit.**

LECT 1 hr

This course provides the entering engineering student with an overview of the engineering profession and the design process. In addition this course is designed to assist the first year engineering science student in their adjustment and success with the college experience. Topics discussed include the engineering course of study, academic advisement and transfer process, types of engineering disciplines, solving techniques, academic expectations, time management and study skills.

ENR-132. Introduction to Experimentation and Design. 3 Credits.

LECT 2 hrs LAB 2 hrs

A required course in the Engineering Technology programs that introduces students to the field of engineering. Students will be introduced to experimental techniques, data collection and representation, as well as the proper method for documenting experimental results. The course will also cover topics that will help students succeed in their field of study and in their college experience.

Corequisites: MAT-016 or placement into MAT 110, or beyond**Additional Fees:** Course fee applies.

ENR-220. Hydraulics and Fluid Power. 3 Credits.

LECT 2 hrs LAB 2 hrs

This course is an exploration into the relationship between pressure, density and temperature as they relate to hydraulic and pneumatic systems. Topics include hydraulic pumps, motors and air compressors. The course emphasizes use of engineering standards and specifications for circuit design and component selection. Electrical controls and application to systems are covered. Lab sessions further expand upon lectures by providing students with physical evidence to support theories and ideas acquired in class.

Prerequisites: MAT-110**Additional Fees:** Course fee applies.**ENR-222. Mechanics of Solids. 3 Credits.**

LECT 3 hrs

Principles of strength of materials are derived for uniaxial stresses and strains, direct shear, torsion bending and combined stresses and column buckling. Also covered are axial force, shear moment and torque in structural members and in statically indeterminate systems. Elementary failure theory of structures and mechanical components is discussed.

Prerequisites: ENR-223.**ENR-223. Engineering Mechanics I (Statics). 3 Credits.**

LECT 3 hrs

This course is a vector approach to statics in a plane and in three dimensions, equilibrium of particles and rigid bodies. Equivalent force systems, structural analysis, centroids and moments of inertia. Virtual work and applied engineering problems are incorporated.

Prerequisites: MAT-131 and PHY-130.**ENR-224. Engineering Mechanics II (Dynamics). 3 Credits.**

LECT 3 hrs

This course is a calculus-based course in dynamics. Kinematics and kinetics of particles and rigid bodies, Newton's laws, work, energy, impulse and momentum are covered. Practical engineering problems are incorporated.

Prerequisites: ENR-223.**ENR-230. Engineering Strength of Materials. 4 Credits.**

LECT 3 hrs LAB 3 hrs

Principles of strength of materials are derived for uniaxial stresses and strains, direct shear, torsion bending, and combined stresses and column buckling. Elementary failure theory of structures and mechanical components is discussed. Laboratory covers a variety of tensile stress-strain, impact and hardness tests, as well as shear stress-strain and the techniques of report writing.

Prerequisites: ENR-223**Additional Fees:** Course fee applies.**ENR-232. Materials Science. 3 Credits.**

LECT 3 hrs

This course covers the properties and structure of materials: atomic bonding, molecular, crystalline, noncrystalline structures and crystalline imperfections. It also covers metallic phases, equilibrium and nonequilibrium reactions, processing and properties of ferrous and non-ferrous metals, polymers, ceramics and composites. In addition, corrosion phenomenon is discussed.

Prerequisites: CHM-125 and CHM-126 and PHY-130.**ENR-234. Independent Study in Technology. 3 Credits.**

LECT 3 hrs

This course is for students in Engineering Technologies. The student selects an area of interest and proposes a plan of study to a sponsoring faculty member who supervises and evaluates the student's progress.

Prerequisites: Permission of department chair.**ENR-235. Engineering Circuit Analysis I. 3 Credits.**

LECT 3 hrs

This first course in engineering circuit analysis covers DC circuit analysis including source transformations, mesh, nodal, superposition, Thevenin and Norton theorems, and the maximum power transfer theorem. Dependent as well as independent sources are included. Transient response of RC, RL and RLC circuits is introduced. Steady-state analysis of single and three phase AC systems is studied using phasor diagrams and the network theorems mentioned above. Real, reactive, apparent power and power factors are included. Use of the computer as a problem-solving tool is included in the course.

Prerequisites: MAT-132.**ENR-236. Engineering Circuit Analysis Laboratory I. 1 Credit.**

LAB 3 hrs

This laboratory course includes experiments in DC, AC and transients to accompany the course work in Engineering Circuit Analysis I.

Corequisites: ENR-235**Additional Fees:** Course fee applies.**ENR-237. Engineering Circuit Analysis II. 3 Credits.**

LECT 3 hrs

This is a second course in engineering circuit analysis. Natural and step response of RL, RC and RLC circuits, mutual inductance, ideal transformers, series and parallel resonance are studied. Laplace transform theory is covered and includes step and impulse response in the S-domain. Bode diagrams of simple and quadratic factors are plotted and the computer is used for actual frequency and phase plots. Fourier Series are studied using both trigonometric and exponential forms.

Prerequisites: ENR-235**Corequisites:** MAT-232.**ENR-238. Engineering Circuit Analysis Laboratory II. 1 Credit.**

LAB 3 hrs

This laboratory course includes experiments on transformers, series and parallel resonance, filters and frequency/phase response plots, and two-port hybrid models to accompany the course work in Engineering Circuit Analysis II.

Prerequisites: ENR-236**Corequisites:** ENR-237**Additional Fees:** Course fee applies.**ENR-240. Engineering Technology Project. 3 Credits.**

LECT 2 hrs LAB 3 hrs

This course covers the design of products and processes considering functional requirements, manufacturing feasibility and economy, and the use of technical literature and catalogs. Includes design layout and working drawings and group and individual projects.

Prerequisites: ENR-117 and MEC-110 and MEC-141**Additional Fees:** Course fee applies.

ENR-241. Instrumentation and Control. 3 Credits.

LECT 2 hrs LAB 3 hrs

This course is an introduction to the study of measuring systems and components, digital and analog signals and their characteristics. Mechanical and electromechanical transducer elements are used to measure pressure, temperature, displacement, velocity and acceleration. Static and dynamic performance of instruments, statistical analysis of experimental data are explored. A brief study of process controllers, programmable logic controllers and final control elements are also explored.

Prerequisites: ELT-201**Additional Fees:** Course fee applies.**ENR-264. Machine Learning. 3 Credits.**

LECT 1 hr LAB 4 hrs

This course provides a practical understanding and foundational principles of Machine Learning techniques. It offers the concepts, the intuitions, and the tools the students need to implement programs capable of learning from data. A large number of techniques are covered, from supervised learning algorithms, unsupervised learning algorithms to Deep Learning techniques and applications. The main goal of this course is to equip students with the skills to tackle real Machine Learning problems encountered in real life and business and establish a project portfolio.

Prerequisites: MAT-114 AND CMP-131, OR Equivalent AND Department Permission**Additional Fees:** Course fee applies.**ENR-290. Special Topics in Technology. 1 Credit.**

LECT 1 hr

This course is for students in Engineering Technologies. The student selects an area of interest and proposes a plan of study to a sponsoring faculty member who supervises and evaluates the student's progress when used for independent study. The course is also used to cover either current or future topics of interest in technology. Topics discussed will have relevance to either electronics technology, mechanical technology or both, and may vary each semester.

Prerequisites: Permission of department chair.**ENR-291. Special Topics in Engineering. 3 Credits.**

LECT 3 hrs

This course is an examination of selected topics or issues in engineering. Topics may differ each time the course is offered. Students should consult the department chair for further information.

Prerequisites: Permission of department chair.**ENR-292. Special Topics in Engineering. 3 Credits.**

LECT 3 hrs

This course is an examination of selected topics or issues in engineering. Topics may differ each time the course is offered. Students should consult the department chair for further information.

Prerequisites: Permission of department chair.**MEC-104. Statics. 3 Credits.**

LECT 3 hrs

This course provides an analysis of force systems acting on particles and rigid bodies; equilibrium in two and three dimensions; trusses, frames and machines; and friction, centroids and moment of inertia of areas.

Prerequisites: MAT-110, ENR-119 and ENR-124 or MAT-110 and ENR-132 or MAT-123.**MEC-109. Manufacturing Process for Engineering Technology. 4 Credits.**

LECT 3 hrs LAB 3 hrs

This course is a study of the methods of prototyping including an introduction to precision measurements, elementary theory of cutting and machining methods with emphasis on the proper operation of the manual lathe and the vertical mill. The course will also provide the student with an introduction to the Computer-Aided Manufacturing (CAM) and the related field of Computerized Numerical Control (CNC). Topics include machine setup, CNC code, both manual and computer assisted, tool offsets and tool changing.

Additional Fees: Course fee applies.**MEC-110. Materials for Engineering Technology. 4 Credits.**

LECT 3 hrs LAB 3 hrs

This course covers metallic, plastic and ceramic materials that are important to manufacturing. Topics include: molecular and microscopic structures in relationship to material properties, testing of mechanical and thermal properties with reference to ASTM standards, equilibrium diagrams and physical metallurgy emphasizing steel and aluminum, heat treatment of steel, molding and forming methods for plastics. A brief study of ceramics and composites is included.

Prerequisites: MAT-007 or equivalent**Additional Fees:** Course fee applies.**MEC-117. Mechanical Prototyping. 2 Credits.**

LECT 1.5 hrs LAB 1.5 hrs

This course is a study of the methods of prototyping including an introduction to precision measurements, elementary theory of cutting and machining methods with emphasis on the lathe operation, milling, drilling and grinding. This course runs for eight weeks.

Additional Fees: Course fee applies.**MEC-118. Computer Integrated Manufacturing (CIM). 2 Credits.**

LECT 1.5 hrs LAB 1.5 hrs

This course is a study of the methods of Computer-Aided Manufacturing (CAM) and the related field of Computerized Numerical Control (CNC). Topics include machine setup, CNC code, manual and post processed programs, rapid prototyping, tool offsets, and tool changing. This course runs for eight weeks.

Prerequisites: MEC-117 or industrial experience**Additional Fees:** Course fee applies.**MEC-141. Strength of Materials for Engineering Technology. 3 Credits.**

LECT 2 hrs LAB 3 hrs

This course studies the mathematical determination of stress and deflection for materials having applied loads of normal, shear, torsion, bending or combinations of these. The rational design of mechanical components, such as fasteners, weldments, tanks, shafts, beams and columns, to satisfy stress, deflection and stability criteria are studied. Also included are Mohr's circle and strain gauge techniques. This course is intended for Engineering Technology students; Engineering Science students should take ENR-230, Engineering Strength of Materials.

Prerequisites: MEC-104 and MAT-110**Additional Fees:** Course fee applies.

MEC-155. Mechanical Components. 4 Credits.

LECT 3 hrs LAB 3 hrs

This course develops the fundamentals of sketching, blueprint reading, dimensioning, tolerances, preferred sizes and fits, and evaluating product quality. It also introduces students to the theory of function of mechanical elements such as linkages, cam bearings, gears belt and chain drives, springs, brakes, clutches, welds, keys, fasteners and power screws.

Prerequisites: MAT-007 or equivalent.**MEC-204. Dynamics for Technology. 2 Credits.**

LECT 2 hrs

This course provides an understanding of the mathematics of the motion of particles and rigid bodies, and of the relation of forces and motion of particles. Upon successful completion of this course, students will describe the motion of particles and rigid bodies as functions of time and position, develop their equations of motions due to applied forces, and determine post impact behavior.

Prerequisites: MAT-110, MEC-104**Corequisites:** PHY-111.**MEC-209. Introduction to Advanced Manufacturing And CNC Programming. 3 Credits.**

LECT 2 hrs LAB 2 hrs

A continuation in the manufacturing process using Computer Numerical Controlled (CNC) milling and turning. Students will learn about and develop advanced manual CNC programs as well as computer-assisted programs (post-processed) derived from CAD (Computer Aided Drafting) drawings. The CNC programs will focus mainly on operations involving three axis milling machines and two axis lathes, but will also touch on operations involving advanced fixture setup and control. Topics will include spindle controls, tool changes, linear and circular interpolation, drilling and tapping, subroutines, and G&M codes. In addition, the course will cover a variety of advanced manufacturing techniques in additive manufacturing (3D Printing), EDM (Electrical Discharge Machining), and reverse engineering techniques using scanners and the CMM (Coordinate Measuring Machine).

Prerequisites: ENR-117 and ((MEC-117 and MEC-118) or MEC-109)**Additional Fees:** Course fee applies.**MEC-229. Cooperative Work Experience-Mechanical Engineering Technology. 3 Credits.**

COOP 3 hrs

Registration is only upon written recommendation of advisor. This course is a field experience in the laboratory facilities of an industrial firm. It is designed for students in the Mechanical Engineering Technology program to obtain industrial experience as a supplement to college studies prior to career employment. Seminar evaluation visitations are included. Completion of 25 technical credits required to enroll.

Prerequisites: Permission of department chair.**MEC-235. Kinematics. 3 Credits.**

LECT 2 hrs LAB 3 hrs

This course is a study of moving elements as used in the design and analysis of basic mechanisms in machines. Velocity and acceleration analysis on a plane, design and analysis of 4-bar linkages, cams, gears and other mechanisms using graphical and analytical methods are studied.

Prerequisites: MAT-110**Corequisites:** PHY-111**Additional Fees:** Course fee applies.**MEC-236. Machine Design. 4 Credits.**

LECT 3 hrs LAB 3 hrs

This course is the rational design and selection of machine elements considering their economics and manufacturability. The principles of strength of materials and mechanics are applied to the design of bearings, shafts, gears, springs, brakes and other elements of importance in mechanical systems. Consideration of service criteria, operating environment and cost. Emphasis is placed on developing a systematic design philosophy.

Prerequisites: MEC-141**Additional Fees:** Course fee applies.**MEC-291. Special Topics in Mechanical Engineering Technology. 3 Credits.**

LECT 3 hrs

This course is an examination of selected topics or issues in Mechanical Engineering Technology. Topics may differ each time the course is offered. Students should consult the department chair for further information.

Prerequisites: An introductory course in Mechanical Engineering Technology.**MEC-292. Special Topics in Mechanical Engineering Technology. 3 Credits.**

LECT 3 hrs

This course is an examination of selected topics or issues in Mechanical Engineering Technology. Topics may differ each time the course is offered. Students should consult the department chair for further information.

Prerequisites: An introductory course in Mechanical Engineering Technology.