The Department of Applied Engineering offers a Bachelor of Science degree with a choice of majors for students desiring to pursue careers in applied engineering or management in industry. Additionally, the department offers a variety of minors and a two-year pre-engineering program for students planning to complete a traditional, professional engineering degree at another institution.

Courses leading to the Bachelor of Science degree are offered for the following majors:

- Applied Manufacturing Engineering (Design and Automation or Manufacturing Management)
- Applied Electronics Engineering
- Industrial Leadership
- Occupational Safety and Health Management

The department also offers a variety of minors to benefit students majoring in other fields.

Requirements for these comprehensive degree programs include 66-67 semester hours of major courses. Students completing these programs are not required to have a minor in another academic discipline. All of the degrees offered through the department focus on the technological needs of manufacturing industries and, as degree programs of study, are designed to prepare management-oriented technical professionals. Programs offered within the department involve:

- application of the knowledge and understanding of materials and production processes
- concepts of management and human relations
- safety
- quality
- communications
- electronics
- graphics
- mathematics
- physical sciences
- computer fundamentals in a problem-solving approach

Program graduates find employment opportunities in a variety of well-paid, professional positions.

The majors have unique provisions for persons already in the workforce and/or two-year college graduates who desire to continue their education and obtain a baccalaureate degree. Technical specialty credit (up to 36 semester hours) is awarded to students who have completed a diploma or associate degree from an approved technical, community, or junior college in an approved technical field. Technical specialty credit may also be awarded for approved management, supervisory, or technical work experience (three semester hours per year for a minimum of three years up to a maximum of six years), or approved professional certification programs. In no case will technical specialty credit awarded exceed 36 semester hours, and it will only be awarded to students pursuing a major that is offered by the Department of Applied Engineering.

High school students preparing for admission to the programs are encouraged to strengthen their background in mathematics and the physical sciences. Algebra, plane geometry, trigonometry, solid geometry, general science, physics, chemistry, and any advanced mathematics are all beneficial subjects for those wishing to study technology and engineering.

### Pre-Engineering

The two-year Pre-Engineering program offers a curriculum that will permit the majority of students to transfer with junior standing to most undergraduate engineering programs at other colleges and universities. A suggested pre-engineering program would include:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EH 101</td>
<td>English Composition</td>
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<tr>
<td>EH 102</td>
<td>English Composition</td>
<td>3</td>
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<tr>
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<td>Oral Communication</td>
<td>3</td>
</tr>
<tr>
<td>HY 101</td>
<td>Western Civilization I</td>
<td>4</td>
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<tr>
<td>&amp; HY 102</td>
<td>and Western Civilization II</td>
<td>4</td>
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<tr>
<td>or HY 201</td>
<td>American History I</td>
<td>3</td>
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<tr>
<td>&amp; HY 202</td>
<td>and American History II</td>
<td>3</td>
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<tr>
<td>EC 221</td>
<td>Principles of Microeconomics</td>
<td>3</td>
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<tr>
<td>CY 105</td>
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<tr>
<td>CY 106</td>
<td>General Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CY 107</td>
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</tr>
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<td>CY 108</td>
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<tr>
<td>MS 125</td>
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<tr>
<td>MS 126</td>
<td>Calculus II</td>
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</tr>
<tr>
<td>MS 227</td>
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</tr>
<tr>
<td>MS 344</td>
<td>Differential Equations</td>
<td>3</td>
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<tr>
<td>PHS 211</td>
<td>Physics for Scientists and Engineers I</td>
<td>4</td>
</tr>
<tr>
<td>PHS 213</td>
<td>Elementary Physics Laboratory Techniques I</td>
<td>1</td>
</tr>
<tr>
<td>PHS 212</td>
<td>Physics for Scientists and Engineers II</td>
<td>4</td>
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<tr>
<td>PHS 214</td>
<td>Elementary Laboratory Techniques II</td>
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<tr>
<td>EG 121</td>
<td>Engineering Graphics I</td>
<td>4</td>
</tr>
<tr>
<td>EG 201</td>
<td>Applied Mechanics - Statics</td>
<td>3</td>
</tr>
<tr>
<td>EG 202</td>
<td>Applied Mechanics - Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>EG 255</td>
<td>Engineering Computation</td>
<td>3</td>
</tr>
</tbody>
</table>

- Applied Electronics Engineering (Bachelor of Science) ([catalog.jsu.edu/undergraduate/business-industry/applied-engineering/applied-electronics-engineering-bs/](catalog.jsu.edu/undergraduate/business-industry/applied-engineering/applied-electronics-engineering-bs/))
- Applied Manufacturing Engineering - Design and Automation (Bachelor of Science) ([catalog.jsu.edu/undergraduate/business-industry/applied-engineering/applied-manufacturing-engineering-design-automation-bs/](catalog.jsu.edu/undergraduate/business-industry/applied-engineering/applied-manufacturing-engineering-design-automation-bs/))
- Applied Manufacturing Engineering - Manufacturing Management (Bachelor of Science) ([catalog.jsu.edu/undergraduate/business-industry/applied-engineering/applied-manufacturing-engineering-manufacturing-management-bs/](catalog.jsu.edu/undergraduate/business-industry/applied-engineering/applied-manufacturing-engineering-manufacturing-management-bs/))
• Industrial Leadership (Bachelor of Science) (catalog.jsu.edu/undergraduate/business-industry/applied-engineering/industrial-leadership-bs/)
• Occupational Safety and Health Management (Bachelor of Science) (catalog.jsu.edu/undergraduate/business-industry/applied-engineering/occupational-safety-health-management-bs/)
• Applied Electronics Engineering Minor (catalog.jsu.edu/undergraduate/business-industry/applied-engineering/applied-electronics-engineering-minor/)
• Design and Automation Minor (catalog.jsu.edu/undergraduate/business-industry/applied-engineering/design-automation-minor/)
• Manufacturing Management Minor (catalog.jsu.edu/undergraduate/business-industry/applied-engineering/manufacturing-management-minor/)
• Occupational Safety and Health Management Minor (catalog.jsu.edu/undergraduate/business-industry/applied-engineering/occupational-safety-health-management-minor/)

**Applied Engineering**

**AE 100 Technology Orientation (2)**
Orientation to the department of Technology. Topics include: Personal and social skills, academic/study skills, Technology career planning, advising, program requirements, university organization. Field trips to various local industries required.

**AE 201 Microcomputers: Applications and Techniques (3)**
Two hours lecture and two hours lab per week. An introduction to microcomputer hardware and applications of the microcomputer in industry. Hands on experience with computer system hardware and software.

**AE 207 Electrical, Fluid Power, and Mechanical Systems (3)**
An introduction to electrical, mechanical and fluid power systems found in manufacturing. Topics include: safety, basic electricity, circuits, inductors and capacitors, AC basic, transformers and three phase power, relays, and motor starters, switches and sensors, hydraulics and pneumatics, mechanics and power transmissions.

**AE 210 Machining/Manufacturing Processes (3)**
An introduction to machining concepts and basic processes. Practical experiences with hand tools, jigs, drills, grinders, mills and lathes is emphasized.

**AE 211 AC/DC Circuits (3)**
Prerequisite(s): MS 112.
Two hours lecture and two hours lab. Scientific and engineering notation; voltage, current, resistance and power, inductors, capacitors, network theorems, phaser analysis of AC circuits.

**AE 225 Electronic Devices I (4)**
Prerequisite(s): MS 112 and AE 211.
Three hours lecture and two hours lab. First course in solid state devices. Course topics include: solid state fundamentals, diodes, BJTs, amplifiers and FETs.

**AE 252 Programmable Controllers (3)**
Prerequisite(s): AE 201 or equivalent.
Two hours lecture and two hours lab. Study of basic industrial control concepts using modern PLC systems.

**AE 305 Industrial Leadership (3)**
Prerequisite(s): Sophomore or higher standing.
Analysis and development of the competencies and knowledge required of industrial leaders to effectively manage production and work teams in a dynamic workplace comprised of a diverse population.

**AE 307 Industrial Training (3)**
Prerequisite(s): AE 201 or equivalent.
Study of time analysis methods used to determine training requirements, assessing personnel and training resources as well as planning, coordinating and evaluating training.

**AE 311 Electronics - Digital (4)**
Prerequisite(s): AE 201 or equivalent.
Three hours lecture and two hours lab per week. Introduction to digital logic, binary numbers and codes, Boolean algebra, gating networks, flip-flops and registers, sequential and combinatorial logic circuits and semiconductor memories.

**AE 316 Advanced Electronics (4)**
Prerequisite(s): AE 225, 311, or equivalents.
Three hours lecture and two hours lab per week. In-depth study of selected electronic concepts. Topics include: computer analysis of major digital logic families, introduction to state logic, transmission lines, and A/D conversion.

**AE 317 Industrial Networking I (3)**
Prerequisite(s): AE 201 or equivalent.
Network fundamentals, routing, Lan switching, wireless and wide area networks.

**AE 318 Problems in Robotics Design and Programming (3)**
Prerequisite(s): EG 255 and approval of instructor.
Problems involving the application and integration of robotic design, remote control of robots, and programming robots for autonomous control.

**AE 319 Advanced Problems in Robotics Design and Programming (3)**
Prerequisite(s): EG 255 and MS 112/113/125 or permission of instructor.
Problems involving the application and integration of robotic design, remote control of robots, and programming robots for autonomous control. This is the second of two courses that constructs and programs a robot to compete in the ATMAE annual robotics contest. The educational objectives are to gain proficiency in research, design, team work and project management.

**AE 326 Electronic Devices II (3)**
Prerequisite(s): AE 225.
Corequisite(s): AE 327.
Second course in solid state devices. Topics include: amplifier frequency characteristics, UJT, SCR, OPTO devices, operational amplifiers, filters, and voltage regulators.

**AE 327 Electronic Devices Lab (1)**
Corequisite(s): AE 326.
Three hours lab per week. Experiments involving basic electronic devices.

**AE 330 Production and Inventory Control (3)**
Prerequisite(s): Sophomore Status.
Examines the issues involved in effective manufacturing, production and inventory control and shows their interrelatedness.

**AE 341 Motion and Time Study (3)**
Prerequisite(s): MS 112.
Analysis of motions necessary to perform industrial operations; motion economy; development of ratings, allowances, standard data, formula construction, work sampling, wage payment and performance training.
AE 342 Employer-Employee Relations (3)
Prerequisite(s): Sophomore Status.
Theory and policy to perform industrial relations; organization and administration, theories of work, labor relations, commitment and morale, communications, employee benefits and services.

AE 343 Managing Engineering Technology (3)
Prerequisite(s): Sophomore Status.
Examination and planning of manufacturing operations, personnel, control methods, equipment and supplies.

AE 344 Manufacturing Cost Analysis (3)
Prerequisite(s): MS 112 and AE 201 or equivalent.
Technical and economic evaluation of manufacturing operations to determine cost and feasibility.

AE 351 Computer-Aided Design II (4)
Prerequisite(s): AE 351 or equivalent.
Three hours lecture and two hours lab. Interpreting engineering drawings and the creation of computer graphics as applied to two-dimensional and three-dimensional drafting and design.

AE 355 Introduction to Pro-E (3)
Prerequisite(s): AE 351 or equivalent.
Two hours lecture and two hours lab each week. A parametric, feature based, solid modeling 3D computer-aided design course for mechanical design.

AE 361 Materials and Processes of Industry (3)
Prerequisite(s): AE 210 or equivalent.
Selection/altering of industrial materials to increase their value, and how they are used in manufacturing. Emphasis on metal and plastics but other materials are discussed.

AE 365 Strength of Industrial Materials (3)
Prerequisite(s): TEC 302 or MS 113 or equivalent.
Internal stresses and deformation of bodies resulting from action of external forces; concepts and techniques of testing tensile, compression, shear, transverse, hardness, elasticity on various materials and fasteners.

AE 366 Control Systems Technology (3)
Prerequisite(s): AE 211.
Coverage of control systems fundamentals to include: open and closed loop systems, measuring instruments characteristics, sensors in control systems, manipulation methods, and types of control systems.

AE 370 Continuous Quality Improvement (3)
Prerequisite(s): AE 210 or equivalent.
An introduction to the concept of continuous quality improvement and its implementation using process improvement teams.

AE 371 Quality Control in Industry (3)
Prerequisite(s): MS 112.
Methods and procedures employed in industrial quality control, theories of measurement, error, prediction, sampling, tests of significance and models.

AE 380 Industrial Safety and Health (3)
Prerequisites: AE 210 and AE 380.
Principles of hazard identification. Engineering and administrative controls and personal protective equipment. Accident analysis and corrective action.

AE 382 Standards of Industrial Safety (3)
Prerequisite(s): AE 210 and AE 380.
Standards for plants and manufacturing operations. Enforcement of safety standards and OSHA checklist.

AE 384 Construction Safety (3)
Prerequisite(s): AE 380.
Concepts of construction safety and health and an in-depth coverage of federal and state construction safety regulations. Recognition and control of construction hazards, fall protection, scaffolding, excavation, and crane safety.

AE 390 Hazard Control Technology (3)
Prerequisite(s): AE 210 and AE 380.
Principles and methods for the analysis and design of processes, equipment, products, facilities, operations and environment.

AE 392 Fire Safety Technology (3)
Prerequisite(s): MS 112.
Fire chemistry and propagation. Recognition and control of fire hazards, fire codes, risk, reports and records, and emergency response.

AE 405 Industrial Leadership II (3)
Prerequisite(s): AE 305.
Advanced analysis and development of the competencies and knowledge required of industrial leaders to effectively manage production and work teams in a dynamic workplace comprised of a diverse population.

AE 407 Industrial Organization and Function (3)
Prerequisite(s): AE 305.
A study of the development and organization of industry and the major functions to include research & development, production, financial control, marketing, and labor. Emphasis on contemporary issues associated with a global economy.

AE 416 Manufacturing Automation and Robotics (3)
Prerequisite(s): AE 201.
Examination of how industrial controls, and industrial robots function in an automated manufacturing environment. Students learn the theory of operation, how to program, and the practical application of robotic systems. Topics will also include software applications and the integration of control systems for manufacturing.

AE 417 Industrial Networking II (4)
Prerequisite(s): AE 317 or equivalent.
Advanced routing and switching in an enterprise network.

AE 427 Industrial Networking III (3)
Prerequisite(s): AE 317 or equivalent.
Monitoring and maintaining complex, enterprise routed and switched IP networks.

AE 429 Applied Digital Communications Systems (3)
Prerequisite(s): AE 201 or equivalent.
A detailed study of digital communications techniques. Topics include: sampling and digital pulse modulation, communications networks and standards, protocol and troubleshooting, digital multiplexing and cellular communications.

AE 436 Inventory Management (3)
Prerequisite(s): AE 330.
Prepares students for positions in the field of production and inventory management through understanding of production scheduling, implementation and design.

AE 440 Manufacturing Management Systems (3)
Prerequisite(s): AE 343 and 344.
The analysis, design, and implementation of world class manufacturing systems for the manufacture of superior, low cost parts. Topics include lean manufacturing, cellular manufacturing, manufacturing teams, integrated quality systems, and other current manufacturing management strategies.
AE 441 Project Management (3)
Prerequisite(s): AE 201 and AE 343.
Prepare students for managing projects in manufacturing and service industries through understanding of how to plan, manage, and deliver projects on time and within budget and how to effectively contribute in project teams.

AE 442 Facilities Planning (3)
Prerequisite(s): AE 343.
Macro and micro level examination of facility planning. Course includes techniques and procedures for developing an efficient facility layout, including collection, analysis, and development of vital and relevant data with emphasis on manufacturing facilities.

AE 451 Advanced Programmable Controllers (3)
Prerequisite(s): TEC 252.
Two hours lecture and two hours lab. Study of advanced control concepts using modern programmable controllers with detailed study of selected controllers. Study of recent controller architectures with emphasis on data communications.

AE 452 Managing and Networking CIMs (3)
Prerequisite(s): AE 351 and 460.
Two hours lecture and two hours lab. CIM group productivity techniques to include basic CIM management concepts, basics of networking, and advanced customization.

AE 460 Computer-aided Manufacturing (3)
Prerequisite(s): AE 351.
Three hours lecture and one hour lab. Utilization of computer technology in the automation of manufacturing systems.

AE 484 Industrial Ergonomics (3)
Prerequisite(s): TEC 302.
Concepts and techniques of work measurements, human factors, and industrial safety and hygiene are merged to provide a comprehensive view of the workplace.

AE 485 Industrial Safety Management (3)
Prerequisite(s): AE 380 and AE 343.
Planning, implementation and evaluation of industrial safety programs.

AE 486 Safety Performance Management (3)
Prerequisite(s): PSY 201 and AE 485.
Concepts and methodologies for evaluating performance of safety programs with emphasis on human behavior and the role of management in influencing safety performance.

AE 487 Systems Safety (3)
Prerequisite(s): AE 380 and MS 204 or AE 371.
Principles and techniques of systems safety analysis to assure safe operation of systems and facilities throughout the life cycle from design to disposal.

AE 488 Industrial Hygiene (3)
Prerequisite(s): AE 380.
Recognition, evaluation, and control of toxic hazards in the work environment. Acute and chronic systemic effects of environmental toxins in the workplace.

AE 489 Hazardous Materials Technology (3)
Prerequisite(s): AE 380.
Practical management and control of hazardous materials and wastes for the safety professional.

AE 491 Industrial Leadership Seminar (3)
Students relate modern leadership practices to practical industrial situations.

AE 493 Senior Seminar (1)
Prerequisite(s): EH 322 or equivalent, Senior Standing and consent of instructor.
Corequisite(s): AE 494.
Coverage of terms, concepts, tools, and skills needed (industrial business, ethics, tech presentations) to succeed as a professional in technological and engineering environments. (Pass/Fail only.)

AE 494 Industrial Internship (2)
Prerequisite(s): EH 322 or equivalent, Senior Standing and approval of instructor.
Corequisite(s): AE 493.
Provides Technology majors with practical industrial experiences via an approved internship arrangement. (Pass/Fail only.)

AE 495 Special Topics in Technology (3)
Prerequisite(s): Senior status and approval of department head.
Special topics of current interest to groups of students in the Technology program concerning content not presented in regular course offerings.

AE 496 Advanced Problems in Technology (3)
Prerequisite(s): Senior status, approval of department head and EH 322 or CBA 350.
Problems involving the application and integration of electronics, industrial safety, quality, industrial management, and/or computer integrated manufacturing technology. This may include an industrial practicum and/or internship.

AE 498 SME Prep (2)
Prerequisite(s): Senior status.
An in-depth and thorough coverage of the terms, concepts, tools and skill needed to obtain the certification of Certified Manufacturing Technologist.

Engineering

EG 112 Engineering Methods (3)
Prerequisite or concurrently: MS 113 or approval of instructor. The use of applied mathematics in solving elementary scientific and engineering problems. Topics include basic mathematical analysis, the electronic calculator, unit systems, metrical, engineering statistics, laboratory procedures and measurements, and computer applications. Three hours lecture.

EG 121 Engineering Graphics I (4)
Prerequisite(s): MS 112 or higher.
Orthographic and isometric projections; multiview projection on principal and auxiliary planes; dimensioning; detail and assembly working drawings. Interactive two-dimensional and three-dimensional computer-aided graphics based. Three hours lecture and two hours laboratory each week.

EG 201 Applied Mechanics - Statics (3)
Prerequisite(s): EG 112, PHS 211, and/or concurrently, MS 126.
Analysis of the principles of mechanics and their engineering applications. Forces; moments and couples; resultants of force systems; equilibrium, friction, centroids, moments of inertia.

EG 202 Applied Mechanics - Dynamics (3)
Prerequisite(s): EG 201 and MS 126.
Absolute and relative motion; force, mass and acceleration; work and energy; impulse and momentum; mechanical vibrations.
EG 226 Electrical Circuits Analysis I (3)
Prerequisite(s): PHS 211 and MS 125.
Electric and magnetic circuit concepts; transient and steady-state solutions of simple circuits. Phasor analysis of AC circuits and network theorems.

EG 251 Engineering Surveying (3)
Prerequisite(s): EG 112.
The use of tapes, levels, transits, and surveying instruments including the theodolite will be studied and applied to problems involving position, area, volume, grade, mapping, distance, evaluation, analysis or error, and land surveying. Two hours lecture and three hours lab.

EG 255 Engineering Computation (3)
Prerequisite(s): MS 113 or equivalent.
Programming, with introduction to numerical methods useful in the solution of engineering, scientific, and mathematical problems. The course is implemented using a high-level programming language. Two hours lecture and two hours integral non-scheduled laboratory required each week.

EG 320 Engineering Economy (3)
Prerequisite(s): MS 112 or equivalent.
Annual cost; present work, rate of return, and profit-cost methods of determining prospective differences among alternatives; depreciation, tax and cost analysis; and replacement and retirement analysis.

EG 328 Electrical Circuits Laboratory (3)
Prerequisite(s): EG 226.
Experiments related to electrical circuits. Application and verification of the principles in electrical circuits. Three hours laboratory hours per week.

EG 343 Strength of Materials (4)
Prerequisite(s): EG 201 and MS 126.
Stress-strain relationships; behavior of materials in tension, compression and shear; column formulae; combined stress computations; theorem of three moments; composite structural members.

EG 361 Thermodynamics (3)
Prerequisite(s): MS 227 and PHS 211.
Heat and work; thermodynamic systems and equations of state; the zeroth, first, and second laws of thermodynamics; change of phase; the combined first and second laws; irreversibility and availability of energy; mixtures of ideal gases; psychrometry.

EG 373 Fluid Mechanics (3)
Prerequisite(s): MS 126 and PHS 211.
Fluid statics; the conservation equations and their applications; dimensional analysis and similitude; flow in closed and open conduits; one-dimensional compressible flow.

EG 374 Fluid and Thermal Laboratory (1)
Laboratory in fluid mechanics, thermodynamics, and related areas. Typical experiments are flows in pipes and channels, flow control devices, gas laws, compressible flow, engine performance. Three laboratory hours per week.

Professor
Bekhouche, Noureddine (catalog.jsu.edu/undergraduate/faculty-admin/faculty/#bekhouche23)

Associate Professor
Godbey, Jessie (catalog.jsu.edu/undergraduate/faculty-admin/faculty/#godbey95)

Instructor
Marker, Michael C. (catalog.jsu.edu/undergraduate/faculty-admin/faculty/#marker177)
Sult, Teje H. (catalog.jsu.edu/undergraduate/faculty-admin/faculty/#sult278)