

# Engineering Technology, B.S.

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## Degree Offered

- Bachelor of Science in Engineering Technology (B.S.)

## Nature of the Program

This general Engineering Technology program provides graduates with instruction in technical and leadership skills necessary for manufacturing and industrial competitiveness and to enter careers in manufacturing process and systems design, operations, quality, continuous improvement, lean manufacturing and sustainability. It prepares graduates with knowledge, problem-solving ability and hands-on skills and to enter careers related to preparation of engineering drawings, design, installation, manufacturing, testing, technical sales, maintenance, improvement of integrated processes, their resulting products (including mechanical components and complex systems) and services within an organization. It draws upon specialized knowledge and skill in the mathematical, natural, physical and social sciences together with the principles and methods of engineering analysis and design, to design and fabricate products and specify, predict and evaluate the results to be obtained from integrated processes and systems. The B.S. Engineering Technology degree curriculum provides a multi-disciplinary overview of engineering technology with a general focus on manufacturing and requires the completion of two Areas of Emphasis.

## Program Educational Objectives

It is expected that, within a few years of graduation, graduates will attain the following Program Educational Objectives (PEOs):

- PEO-1. Graduates will be engaged in their professional careers, have consolidated professional proficiency as practitioners in an area of engineering technology as reflected by their responsibilities and accomplishments of their professional practice, and engage in lifelong learning and service opportunities.
- PEO-2. Graduates will be able to work competitively and collaboratively in diverse professional environments as demonstrated by their abilities to work on teams and independently, to provide leadership, and to communicate effectively to a variety of audiences.
- PEO-3. Graduates will behave professionally and ethically, be committed to responsible safety practices, and articulate the societal impact of their work.

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## FACULTY

### TEACHING PROFESSOR

- Robin A. M. Hensel - Ed.D (West Virginia University)

### TEACHING ASSISTANT PROFESSOR

- Emily Spayde - Ph.D. (Mississippi State University)

## Degree Requirements

Students must meet the following criteria to qualify for a Bachelor of Science in Engineering Technology degree:

- Complete a minimum of 120 credit hours
- Satisfy WVU's undergraduate degree requirements
- Satisfy Statler College's undergraduate degree requirements
- Complete all courses listed in the curriculum requirements with the required minimum grades
- Attain an overall grade point average of 2.00 or better
- Attain a WVU grade point average of 2.00 or better
- Attain a Statler grade point average of 2.00 or better
- A maximum of one math or science courses with a grade of D+, D, or D- may apply towards a Statler College degree
- Complete a survey regarding their academic and professional experiences at WVU, as well as post-graduation job placement or continuing education plans.

The Statler GPA is computed based on all work taken at WVU with a subject code within Statler College (BIOM, BMEG, CE, CHE, CPE, CS, CSEE, CYBE, EE, ENGR, ETEC, IENG, IH&S, MAE, MINE, PDA, PGE, SAFM, SENG) excluding ENGR 140, ENGR 150, and CS 101. The WVU GPA is computed based on all work taken at WVU. The Overall GPA is computed based on all work taken at WVU and transfer work.

## Curriculum Requirements

Code	Title	Hours
	University Requirements	25
	Fundamentals of Engineering Requirements	5
	Math and Science Requirements	21
	Engineering Technology Program Requirements	69
Total Hours		120

## University Requirements

Code	Title	Hours
	General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)	
	Outstanding GEF Requirements 1, 4, 6, 7	15
ENGR 191	First-Year Seminar	1
	General Electives	9
Total Hours		25

## Fundamentals of Engineering Requirements

Code	Title	Hours
A minimum grade of C- is required in all Fundamentals of Engineering courses.		
ENGR 101	Engineering Problem Solving 1	2
	Engineering Problem Solving (Select one of the following):	3
CHE 102	Introduction to Chemical Engineering	
CS 110 & 110L	Introduction to Computer Science and Introduction to Computer Science Laboratory	
ENGR 102	Engineering Problem-Solving 2	
ENGR 103	Introduction to Nanotechnology Design	
MAE 102	Introduction to Mechanical and Aerospace Engineering Design	
Total Hours		5

## Math and Science Requirements

Code	Title	Hours
A minimum grade of C- is required in all Math and Science courses.		
	Chemistry	4
CHEM 111 & 111L	Survey of Chemistry 1 and Survey of Chemistry 1 Laboratory	
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory	
	Calculus 1 (GEF 3):	3
MATH 150	Applied Calculus	
MATH 153 & MATH 154	Calculus 1a with Precalculus and Calculus 1b with Precalculus	
MATH 155	Calculus 1	
	Calculus 2	3
MATH 151	Applied Calculus 2	
MATH 156	Calculus 2	
	Physics 1	4
PHYS 101 & 101L	Introductory Physics 1 and Introductory Physics 1 Laboratory	
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory	
	Physics 2	4

PHYS 102 & 102L	Introductory Physics 2 and Introductory Physics 2 Laboratory	
PHYS 112 & 112L	General Physics 2 and General Physics 2 Laboratory	
Statistics		3
STAT 211	Elementary Statistical Inference	
STAT 215	Introduction to Probability and Statistics	
Total Hours		21

## Engineering Technology Program Requirements

Code	Title	Hours
Computer Applications		2
BCOR 121	Introduction to Business Applications	
CS 101 & CS 110L	Intro to Computer Applications and Introduction to Computer Science Laboratory	
WRIT 305	Technical Writing	3
ENGR 140	Engineering in History (also meets GEF 5)	3
ETEC 199	Introduction to Engineering Technology	1
ETEC 130 & 130L	Manufacturing Processes 1 and Manufacturing Processes 1 Laboratory	3
ETEC 210 & 210L	Engineering Graphics and Descriptive Geometry and Engineering Graphics and Descriptive Geometry Laboratory	3
ETEC 220 & 220L	Applications of Technology and Applications of Technology Laboratory	3
ETEC 310 & 310L	Material Science with Applications and Material Science with Applications Laboratory	3
ETEC 330 & 330L	Manufacturing Processes 2 and Manufacturing Processes 2 Laboratory	3
ETEC 340 & 340L	Electronic Circuits and Electronic Circuits Laboratory	4
ETEC 350	Analysis for Engineering Technology	3
ETEC 401	Science, Technology, & Society	2
ETEC 440 & 440L	Industrial Automation PLC 1 and Industrial Automation PLC 1 Laboratory	3
ETEC 475S	Engineering Technology Capstone Experience	3
IENG 377	Engineering Economy	3
IENG 445	Project Management for Engineers	3
Area of Emphasis 1		12
Area of Emphasis 2 *		12
Total Hours		69

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For the second Area of Emphasis, three credits will be replaced with one of the Application requirement choices.

## Plan of Study

### First Year

Fall	Hours	Spring	Hours
ENGL 101 (or GEF 4)		3 BCOR 121	2
ENGR 191		1 ENGL 101 (or GEF 4)	3
ETEC 199		1 ETEC 210 & 210L	3
ETEC 130 & 130L		3 MATH 151	3

MATH 150		3 PHYS 102 & 102L	4
PHYS 101 & 101L		4	
		15	15
<b>Second Year</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
CHEM 111 & 111L		4 ENGL 102	3
ENGR 101		2 ENGR 102	3
ENGR 140		3 ETEC 310 & 310L	3
ETEC 220 & 220L		3 AoE 1 Elective (#1)	3
STAT 211		3 AoE 2 Elective (#1)	3
		15	15
<b>Third Year</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
ETEC 330 & 330L		3 WRIT 305	3
ETEC 340 & 340L		4 ETEC 370 (Applied Workshop (#2))	1
ETEC 350		3 ETEC 440 & 440L	3
ETEC 370 (Applied Workshop (#1))		1 IENG 377	3
AoE 1 Elective (#2)		3 AoE 2 Elective (#2)	3
		GEF 6	3
		14	16
<b>Fourth Year</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
ETEC 401		2 ETEC 475S	3
ETEC 370 (Applied Workshop (#3))		1 IENG 445	3
AoE 1 Elective (#3)		3 AoE 1 Elective (#4)	3
AoE 2 Elective (#3)		3 General Elective	3
General Elective		3 GEF 7	3
General Elective		3	
		15	15

Total credit hours: 120

## Areas of Emphasis

- Engineering Technology
- Engineering Management and Entrepreneurship
- Industrial Engineering Technology
- Mechanical Engineering Technology
- Multi-Disciplinary Engineering Technology

## Energy Technology Area of Emphasis

Code	Title	Hours
A minimum grade of C- is required in each course.		
Select 12 credit hours from the following:		
ARE 445	Energy Economics	12
DSGN 280	Sustainable Design and Development *	
DSGN 340	Design for Energy Efficiency	

DSGN 470	Leadership in Energy and Environmental Design Green Building Systems
ENGR 310	Energy Engineering
ENLM 200	Principles of Energy Land Management *
ENLM 220	Energy Production & Operations *
ENLM 250	Managing Non-Technical Risks *
ENLM 300	Ethics and Negotiations for Energy Land Managers
ENLM 415	Midstream Energy Planning and Development
ENLM 442	GIS Skills for Energy Land Management
IENG 433	Energy Efficiency and Sustainability
MAE 320	Thermodynamics
or ETEC 320	Thermodynamics for Engineering Technology
RESM 405L	Drones in Resource Management
RESM 440 & 440L	Foundations of Applied Geographic Information Systems and Foundations of Applied Geographic Information Systems Laboratory
RESM 460	Energy Project and Program Management

Any 200- or 300- or 400-level Chemical Engineering (CHE), Civil Engineering (CE), Mining Engineering (MINE), or Petroleum and Natural Gas Engineering (PNGE) courses

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Total Hours 12

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A maximum of 3 credit hours may be selected at the 200-level.

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If this is the second Area of Emphasis selected, three credits will be replaced with one of the following courses:

- ETEC 370
- ETEC 450
- ETEC 491

## Engineering Management and Entrepreneurship Area of Emphasis

Code	Title	Hours
A minimum grade of C- is required in each course.		
Select 12 credit hours from the following:		12
BCOR 320	Legal Environment of Business	
BCOR 330	Information Systems and Technology	
BCOR 340	Principles of Finance	
BCOR 350	Principles of Marketing	
BCOR 360	Supply Chain Management	
BCOR 370	Principles of Management	
BCOR 380	Business Ethics	
COMM 404	Persuasion	
or COMM 335	Social Media in the Workplace	
ENGR 450	Technology Entrepreneurship and Enterprise Development	
ENR 400	Advanced Concepts in Entrepreneurship	
ENR 405	Entrepreneurial Creativity & Innovation	
ENR 420	Entrepreneurial Finance	
ENR 430	Business Analysis and Planning	
ENR 436	Family Business	
ENR 440	Small Business Consulting	
ENR 455	Entrepreneurial Opportunity Identification	
ENR 460	Entrepreneurship Practicum	
HRMG 470	Conflict Management	
IENG 474	Technology Entrepreneurship	

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Total Hours 12

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A maximum of 3 credit hours may be selected at the 200-level.

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- ETEC 370
- ETEC 450
- ETEC 491

## Industrial Engineering Technology Area of Emphasis

Code	Title	Hours
A minimum grade of C- is required in each course.		
Select 12 credit hours from the following:		12
COMM 306	Organizational Communication	
DSGN 270	Product Design Foundations *	
GSCM 450	Supply Chain Quality Management	
IENG 220	Re-Engineering Management Systems *	
IENG 331	Computer Applications in Industrial Engineering	
IENG 461	System Safety Engineering	
IENG 473	Team Facilitation	
SAFM 470	Managing Construction Safety	
SAFM 471	Motor Fleet Safety	
Any 200- or 300- or 400-level Industrial Engineering course (except for IENG 377 and IENG 445)		
Total Hours		12

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A maximum of 3 credit hours may be selected at the 200-level.

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- ETEC 370
- ETEC 450
- ETEC 491

## Mechanical Engineering Technology Area of Emphasis

Code	Title	Hours
A minimum grade of C- is required in each course.		
Select 12 credit hours from the following:		12
AGEE 303	Small Engines and Hydraulics	
FNRS 333	Wood Machining	
FNRS 337 & 337L	Wood Adhesion and Finishing and Wood Adhesion and Finishing Laboratory	
FNRS 341 & 341L	Wood Mechanics and Wood Mechanics Laboratory	
MAE 211	Mechatronics *	
MAE 241	Statics *	
MAE 459	Hybrid Electric Vehicle Propulsion and Control	
Any 300- or 400-level MAE course (except for MAE 312)		
Total Hours		12

\*

A maximum of 3 credit hours may be selected at the 200-level.

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- ETEC 370
- ETEC 450
- ETEC 491

## Multi-Disciplinary Engineering Technology Area of Emphasis

Students work with their assigned Academic Advisor to create a proposed AoE course plan designed to meet the student's stated career goals or interests. The plan is submitted to the Director/Chair of the B.S. Engineering Technology program/department for review and approval.

Code	Title	Hours
A minimum grade of C- is required in each course.		
<b>Select 12 credits from the following:</b>		<b>12</b>
Select courses from Energy Technology Area of Emphasis		
Select courses from Engineering Management and Entrepreneurship Area of Emphasis		
Select courses from Industrial Engineering Technology Area of Emphasis		
Select courses from Mechanical Engineering Technology Area of Emphasis		
Any 200- or 300- or 400- level Statler College Course (except IENG 377 IENG 445, and MAE 312)		
Total Hours		12

\* Only 3 credits may be selected at the 200-level.

\*\* The plan must be approved in writing by the Director/Chair of the B.S. Engineering Technology program/department.

\*\*\* If this is the second Area of Emphasis selected, three credits will be replaced with one of the following courses:

- ETEC 370
- ETEC 450
- ETEC 491

## Major Learning Outcomes

### ENGINEERING TECHNOLOGY

Engineering technology graduates develop, design, and implement engineering and technology solutions, typically pursuing engineering careers in manufacturing firms on design, construction, and product improvement.

Skills and outcomes include:

- Solve technical mathematical problems
- Utilize basic engineering graphics with 2D CAD
- Create multi-view drawings using 2D and 3D CAD
- Create assembly drawings from 3D models
- Create complex surfaced part models using 3D CAD
- Design for predictability and manufacturing ease
- Document technical activities in written and verbal reports
- Be prepared for successful employment