

# Bachelor of Science in Engineering

## Technology

# Engineering Technology with a Major in Manufacturing Engineering Technology (BSET)

## Manufacturing Engineering Technology

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The Bachelor of Science in Engineering Technology (BSET) degree program in Manufacturing Engineering Technology (MfgET) offers courses at the senior level specializing in manufacturing systems. Students in this program take common courses in areas such as computer-aided drafting, manufacturing processes, statics, strength of materials, dynamics, and automation and controls. The program culminates in a senior project that integrates coursework with a practical project assignment in the student's area of interest. To satisfy the upper-division general education requirements, students are required to complete a minor within the College of Engineering and Technology or the College of Sciences. Graduates should be qualified for application positions in manufacturing systems design, development and manufacturing, maintenance, field operations, and various other technical functions.

### Mission Statement

The mission of the Manufacturing Engineering Technology (MfgET) program is to sustain a high quality undergraduate program of study leading to the Bachelor of Science in Engineering Technology degree. It is a significant component of the University's commitment to science, engineering and technology, particularly in fields of major importance to the region. Through the University's distance learning program, the mechanical engineering technology program provides opportunities for technical personnel throughout the state and elsewhere to enhance their education and pursue baccalaureate level studies. Simultaneously, the program supports the general education components that yield a well-rounded graduate who is aware of societal needs and issues.

### Program Educational Objectives

The objective of the manufacturing engineering technology program is to prepare graduates to establish themselves as successful professionals in manufacturing systems or related areas during the first few years of their careers by having demonstrated their ability to:

1. Identify and solve increasingly complex technical problems, both theoretically and practically, as raised by continually evolving technologies and industry needs and practices.
2. Make educated, responsible, and ethical decisions in response to the needs of the profession and society, with these decisions solidly grounded in science and engineering fundamentals.
3. Work effectively as member or leader of technical teams and clearly communicate ideas leading to successful team outcomes

### Student Outcomes

The manufacturing engineering technology program has adopted, after deliberations by its constituents, five student outcomes for the Bachelor of Science in Engineering Technology degree program in manufacturing engineering technology. These outcomes are listed below:

1. an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
2. an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
3. an ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
4. an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and
5. an ability to function effectively as a member as well as a leader on technical teams.

### Curriculum

The curriculum provides baccalaureate degree graduates with instruction in the knowledge, techniques, skills, and use of modern equipment in manufacturing engineering technology. Baccalaureate degree graduates build on the strengths of associate degree programs by gaining the knowledge, skills, and abilities for entry into manufacturing careers practicing various tools, techniques and processes. The curriculum must include instruction in the following topics:

1. materials and manufacturing processes;
2. product design process, tooling, and assembly;
3. manufacturing systems, automation, and operations;
4. statistics, quality and continuous improvement, and industrial organization and management; and
5. capstone or integrating experience that develops and illustrates student competencies in applying both technical and non-technical skills in successfully solving manufacturing problems.

### Requirements

#### Lower-Division General Education

Written Communication ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#written">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#written</a> )	6
Oral Communication ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#oral">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#oral</a> )	3
Mathematics ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#math">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#math</a> )	3
Language and Culture ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#language">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#language</a> )	0-6
Information Literacy and Research ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#information">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#information</a> )	3
Human Behavior ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#behavior">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#behavior</a> )	3
Human Creativity ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#creativity">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#creativity</a> )	3
Interpreting the Past ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#interpret">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#interpret</a> )	3
Literature ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#literature">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#literature</a> )	3
Philosophy and Ethics ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#philosophy">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#philosophy</a> )	3
The Nature of Science ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#nature">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#nature</a> )	8
Impact of Technology ( <a href="http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#impact">http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#impact</a> )	3

General Education requirements in information literacy and research, impact of technology, and philosophy and ethics are met through the major.

#### Upper-Division General Education

Met in the major through a built-in minor in engineering management.

## Requirements for Graduation

Requirements for graduation include the following:

- Minimum of 120 credit hours.
- Minimum of 30 credit hours overall and 12 credit hours of upper-level courses in the major program from Old Dominion University.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken toward the major.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken toward a minor.
- Completion of ENGL 110C, ENGL 211C or ENGL 231C, and the writing intensive (W) course in the major with a grade of C or better. The W course must be taken at Old Dominion University.
- Completion of Senior Assessment.

## Manufacturing Engineering Technology Major

Students completing this program will receive a minor in engineering management.

Critical MET course sequences within the Manufacturing Engineering Technology curriculum require a minimum grade of C before progressing to subsequent courses. A grade of C- does not satisfy the requirement for a C grade.

The following courses require a minimum grade of C:

ENGL 110C	English Composition	3
ENGL 211C or ENGL 231C	Writing, Rhetoric, and Research Writing, Rhetoric, and Research: Special Topics	3
MATH 162M	Precalculus I	3
MATH 163	Precalculus II	3
MATH 211	Calculus I	4
MET 220	Strength of Materials	3
MET 300	Thermodynamics	3
ENGT 435W	Senior Design Project	3

### General Education

Complete lower-division requirements 32-38

Complete upper-division requirements (met in the major through a built-in minor in engineering management)

### Manufacturing Engineering Technology Major

Complete the manufacturing engineering technology major requirements as shown on the degree program guide 95

**Total Credit Hours 127-133**

## Degree Program Guide\*

The Degree Program Guide is a suggested curriculum to complete this degree program in four years. It is just one of several plans that will work and is presented only as broad guidance to students. Each student is strongly encouraged to develop a customized plan in consultation with their academic advisor. Additional information can also be found in Degree Works.

Course	Title	Credit Hours
<b>Freshman</b>		
<b>Fall</b>		
MET 120	Computer Aided Drafting	3
ENGN 110	Explore Engineering and Technology	2
MATH 162M	Precalculus I (grade of C or better required)	3

CHEM 121N	Foundations of Chemistry I Lecture **	3
CHEM 122N	Foundations of Chemistry I Laboratory **	1
Human Behavior Way of Knowing		3
<b>Credit Hours</b>		<b>15</b>
<b>Spring</b>		
MET 230	Engineering Graphics and Computer Solid Modeling	3
ENGT 111	Engineering Technology Information Literacy/Research	2
MATH 163	Precalculus II (grade of C or better required)	3
PHYS 111N	Introductory General Physics	4
ENGL 110C	English Composition (grade of C or better required)	3
<b>Credit Hours</b>		<b>15</b>
<b>Sophomore</b>		
<b>Fall</b>		
MET 200	Manufacturing Processes and Methods	3
MET 210	Statics	3
MATH 211	Calculus I (grade of C or better required)	4
PHYS 112N	Introductory General Physics	4
ENGL 211C or ENGL 231C	Writing, Rhetoric, and Research (grade of C or better required) or Writing, Rhetoric, and Research: Special Topics	3
<b>Credit Hours</b>		<b>17</b>
<b>Spring</b>		
MET 220	Strength of Materials (grade of C or better required)	3
MET 225	Strength of Materials Laboratory	1
STEM 221 or STEM 231	Industrial Materials or Materials and Processes Technology	3
COMM 101R	Public Speaking	3
Human Creativity Way of Knowing		3
Literature Way of Knowing		3
<b>Credit Hours</b>		<b>16</b>
<b>Junior</b>		
<b>Fall</b>		
MET 300	Thermodynamics (grade of C or better required)	3
MET 310	Dynamics	3
MET 320	Design of Machine Elements	3
ENGT 305	Advanced Technical Analysis	3
EET 350	Fundamentals of Electrical Technology	3
EET 355	Electrical Laboratory	1
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
MET 330	Fluid Mechanics	3
MET 335	Fluid Mechanics Laboratory	1
MET 350	Thermal Applications	3

MET 370	Automation and Controls ***	3
MET 386	Automation and Controls Laboratory ***	1
ENMA 480	Ethics and Philosophy in Engineering Applications ****	3
Approved Manufacturing Elective		3
<b>Credit Hours</b>		<b>17</b>
<b>Senior</b>		
<b>Fall</b>		
MET 387	Power and Energy Laboratory	2
ENGT 434	Introduction to Senior Project	1
ENGN 401	Fundamentals of Engineering Review	1
Approved Manufacturing Elective		3
Approved Manufacturing Elective		3
Interpreting the Past Way of Knowing		3
ENMA 302	Engineering Economics	3
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
ENGT 435W	Senior Design Project (grade of C or better required)	3
Approved Manufacturing Elective		3
Approved Manufacturing Elective		3
ENMA 401	Project Management	3
ENMA 421	Decision Techniques in Engineering	3
<b>Credit Hours</b>		<b>15</b>
<b>Total Credit Hours</b>		<b>127</b>

## Manufacturing Engineering Technology Approved Electives

MET 400	Computer Numerical Control in Production	3
MET 405	Introduction To Welding Technologies	3
MET 406	Additive Manufacturing	3
MET 410	Advanced Manufacturing Processes	3
MET 415	Introduction to Robotics	3
MET 420	Design for Manufacturing	3
MET 426	Introduction to Mechatronics	3
MET 427	Mechatronic System Design	3
MET 431	Modeling and Simulation of Mechatronic Systems	3
MET 445	Computer Integrated Manufacturing	3
MET 455	Lean Engineering	3
MET 465	Geometric Dimensioning and Tolerancing	3
EET 405	Data Communications and Computer Networks	3

\* Does not include the University's General Education language and culture requirement. Additional hours may be required.

\*\* Must be taken together.

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\*\*\*\* Meets philosophy and ethics general education requirement.

## Linked Bachelor's/Master's Degree Programs

These are designed to allow qualified students to secure a space in a master's program available in the Frank Batten College of Engineering and Technology while they are still pursuing their undergraduate degrees. An eligible student can choose a master's program in the same discipline as his/her bachelor's program or in a complementary discipline. Subject to the approval of the undergraduate and graduate program directors, a student enrolled in a linked program can count up to six credit hours of course work towards both the undergraduate and the graduate degrees. Full-time students may be able to complete the requirements for the bachelor's degree in four years and the master's degree in one additional year. Students in linked programs must earn a minimum of 150 credit hours (120 discrete credit hours for the undergraduate degree and 30 discrete credit hours for the graduate degree).

Students who are matriculated in an undergraduate major in the Frank Batten College of Engineering and Technology with a GPA of at least 3.00 overall and 3.00 in the major are eligible to apply for admission to a linked bachelor's/master's program. Transfer students who desire to be admitted to a linked program at the time they join an undergraduate major at Old Dominion University are eligible to apply if their overall GPA at their previous institution is 3.25 or higher. Prerequisite courses may be required for engineering technology majors to pursue a master's degree in engineering.

Continuance in a linked bachelor's/master's program requires maintenance of a GPA of 3.00 or higher overall and in the major.

## Bachelor-to-PhD Programs

For a select number of exceptionally well-qualified students, the college has established a linked doctoral program that enables students to be admitted directly into the PhD program upon completion of the baccalaureate degree. A select number of exceptionally well-qualified students can be admitted to the Bachelor/PhD program in their junior year while they are pursuing one of the undergraduate programs at Old Dominion University. This program encourages admitted students to work closely with faculty members and pursue a research experience. Just as in the linked Bachelor/MS program, six credit hours of graduate course work may again be counted towards the undergraduate degree and doctoral course work mentioned above for the Bachelor/PhD program. For linked bachelor's to doctoral programs, students must earn a minimum of 198 credit hours (120 discrete credit hours for the undergraduate degree and 78 discrete credit hours for the graduate degree). Students in these programs must maintain a GPA of 3.50 or better throughout their bachelor's and doctoral studies.

The student may opt to obtain the master's degree along the way to the doctorate. To obtain the master's degree, the student must utilize the six graduate credits obtained as part of their undergraduate program, use 18 credits of the graduate course work that is part of the PhD, and also write a master's thesis.