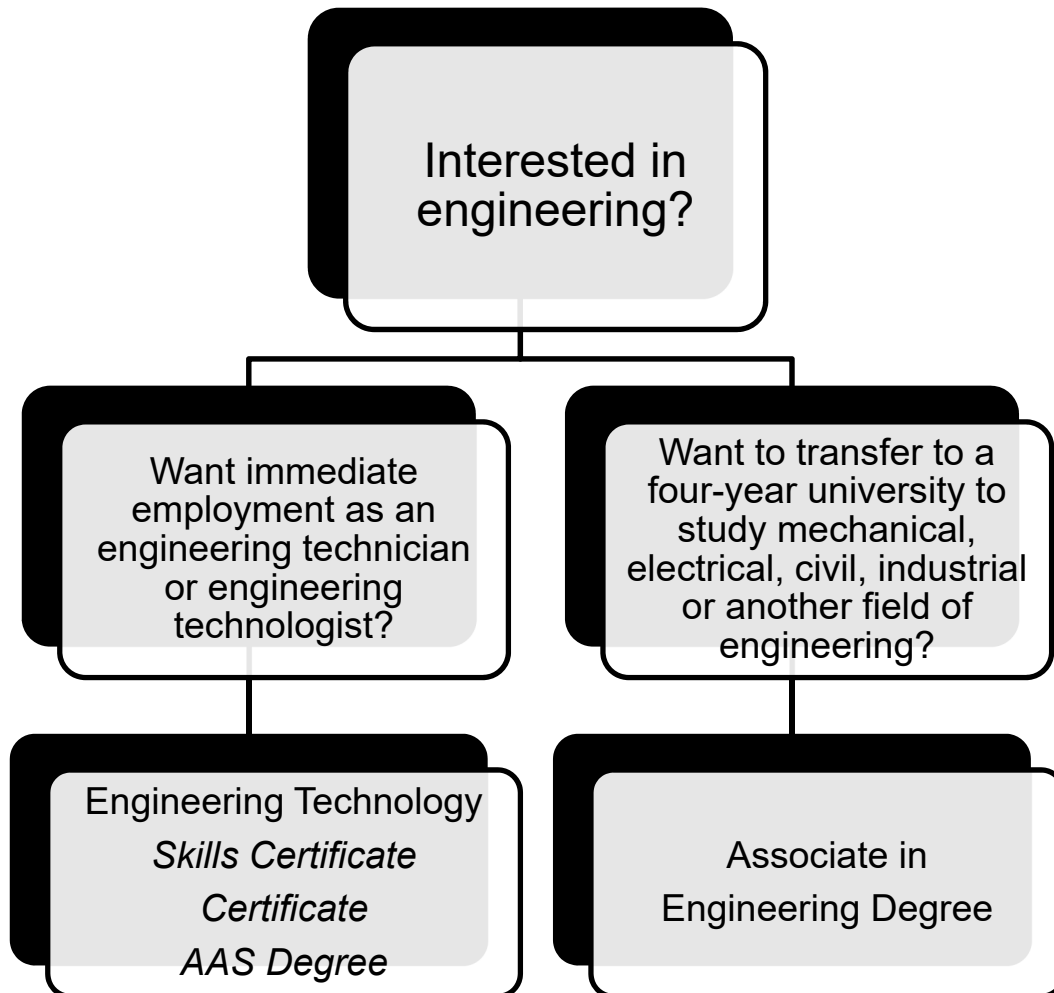


## Engineering Technology and Pre-Engineering



### Credentials

|  |           |
|--|-----------|
| Engineering Technology Skills Certificate  | 18 cr.    |
| Engineering Technology Certificate   | 30 cr.    |
| Engineering Technology AAS Degree  | 60-64 cr. |
| Engineering Technology AAS Degree – <i>with Department of Labor Apprenticeship Certificate</i> | 60 cr.    |
| Associate in Engineering Transfer Degree   | 60 cr.    |

## Engineering Major Description

The practice of Engineering is focused on the design, development, testing, and use of machines, technology, and structures. **Engineers** apply science and math principles to develop new products, improve systems, and solve technical problems. **Engineering Technicians or Technologists** assist engineers in many ways, such as setting up and operating equipment, running tests, and collecting data.

Schoolcraft's Engineering Technology program offers three levels of credentials to prepare students to seek immediate employment as an engineering technician or technologist in a variety of work settings. Students will develop workplace readiness through educational experiences with a real-world focus in the ever-changing fields of engineering, manufacturing, and technology:

- The **Engineering Technology Skills Certificate** is designed to provide foundational skills to prepare a student for employment in the manufacturing industry.
- The **Engineering Technology Certificate** builds upon the Skills Certificate, enhancing a student's career opportunity as an engineering technician or engineering technologist.
- The **Engineering Technology AAS** is designed to enable individuals the opportunity to continually expand and upgrade their applied skills as well as to maintain a thorough mastery of evolving manufacturing technologies. AAS graduates may also consider transferring to another college or university to earn a Bachelor's degree in Engineering Technology.
  - Individuals who have successfully completed the Department of Labor Apprenticeship Certificate in a technical occupation, may be able to apply 21-45 credits toward the completion of an Engineering Technology AAS. Contact the Associate Dean of Occupational Programs in Engineering and Technology for further details.

Students seeking to transfer to a four-year institution to pursue a Bachelor's degree in engineering can begin their studies with Schoolcraft's two-year Associate of Engineering degree:

- The **Associate of Engineering degree** allows the student to establish a strong academic foundation in mathematics and science and complete courses to fulfill general education requirements—all before moving on to a Bachelor's degree in Engineering program at another college or university.
    - Civil, chemical, computer systems, electrical, environmental, industrial, and mechanical engineering are among the most popular bachelor's degrees, although there are more than 25 recognized specialties.
    - Schoolcraft's degree can prepare the student for transfer into any engineering specialty.
    - The specific courses required will be determined by the destination college or university and/or the student's intended major.
    - Students must work with an academic advisor to ensure that their courses transfer.
-

## Engineering Technology Skills Certificate

Schoolcraft program code # CRT.00271

This Skills Certificate is designed to provide foundational first steps for employment as an engineering technician or engineering technologist. These courses apply directly to programs leading to additional credentials, including certificates and Associate Degrees for students seeking to further their education beyond this program.

Students who satisfactorily complete the program requirements qualify for a certificate of completion. All program required courses must be completed with a grade of 2.0 or better.

Not all courses are offered each semester. Students should work with an academic advisor to develop a schedule that will work for them. Students planning to transfer should check the transfer institution's requirements/guides or discuss their options with an academic advisor. Number of credits may vary depending on the course selection.

### SAMPLE SCHEDULE OF COURSES

#### First Year - Fall Semester

| Course #    | Course Title                               | Credits |
|-------------|--|---------|
| ENGR 100    | Introduction to Engineering and Technology | 3       |
| CIS 120     | Software Applications                      | 3       |
| Mathematics | Select one:                                | 4       |
| MATH 102    | Technical Mathematics                      |         |
| MATH 113    | Intermediate Algebra for College Students  |         |
|             | <b>Total Credits: 10</b>                   |         |

#### First Year - Winter Semester

| Course #  | Course Title  | Credits |
|-----------|---|---------|
| CAD 120   | Mechanical Blueprint Reading with Sketching         | 3       |
| Elective* | Select from list (minimum 3 credits)                | 3       |
| OSH       | Select one:   | 2       |
| OSH 111   | Occupational Safety and Health for General Industry |         |
| OSH 112   | Occupational Safety and Health for Construction     |         |
|           | <b>Total Credits: 8</b>                             |         |

## Engineering Technology Skills Certificate (continued)

### Electives

| <b>Course #</b> | <b>Course Title</b>                                   | <b>Credits</b> |
|-----------------|---|----------------|
| CAD 210         | <b>CATIA – 3D and 2D Applications</b>                 | 4              |
| CAD 220         | <b>SolidWorks – 3D and 2D Applications</b>            | 4              |
| CAD 230         | <b>NX – 3D and 2D Applications</b>                    | 4              |
| ELECT 131       | <b>Basic Measurement and Reporting Skills</b>         | 3              |
| MET 103         | <b>Introduction to Materials Science</b>              | 3              |
| MFG 102         | <b>Basic Machining Processes</b>                      | 3              |
| MFG 105         | <b>Manufacturing Processes</b>                        | 4              |
| PLAST 130       | <b>Introduction to Plastic Materials</b>              | 3              |
| PLAST 131       | <b>Introduction to Plastic Processing</b>             | 3              |
| QM 106          | <b>Introduction to Quality Improvement Tools</b>      | 3              |
| ROBAT 101       | <b>Robot Tool Handling Operations and Programming</b> | 3              |
| WELD 110        | <b>Introduction to Welding Basics for Fabrication</b> | 3              |

### **PROGRAM TOTAL 18 CREDITS**

*\*Students planning to continue studies in pursuit of a certificate or Associate Degree are encouraged to select a course which can be applied to a future program of study. Discuss options with an academic advisor.*

## Engineering Technology Certificate

Schoolcraft program code # 1YC.00272

This Certificate is designed to provide introductory educational experiences for those students seeking to start or enhance their career as an engineering technician or engineering technologist. This Certificate provides technical skill and knowledge enhancement in addition to building essential job-related communication skills. All courses apply directly to programs leading to Associate Degrees for students seeking to further their education beyond this program.

Students who satisfactorily complete the program requirements qualify for a certificate of completion. All program required courses must be completed with a grade of 2.0 or better.

Not all courses are offered each semester. Students should work with an academic advisor to develop a schedule that will work for them. Students planning to transfer should check the transfer institution's requirements/guides or discuss their options with an academic advisor. Number of credits may vary depending on the course selection.

### SAMPLE SCHEDULE OF COURSES

#### First Year - Fall Semester

| Course #    | Course Title  | Credits |
|-------------|---|---------|
| ENGR 100    | Introduction to Engineering and Technology          | 3       |
| CIS 120     | Software Applications                               | 3       |
| Mathematics | Select one:   | 4       |
| MATH 102    | Technical Mathematics                               |         |
| MATH 113    | Intermediate Algebra for College Students           |         |
| OSH         | Select one:   | 2       |
| OSH 111     | Occupational Safety and Health for General Industry |         |
| OSH 112     | Occupational Safety and Health for Construction     |         |
|             | <b>Total Credits: 12</b>                            |         |

#### First Year - Winter Semester

| Course #  | Course Title                                | Credits |
|-----------|---|---------|
| CAD 120   | Mechanical Blueprint Reading with Sketching | 3       |
| Elective* | Select from list (minimum 3 credits)        | 3       |
| QM 106    | Introduction to Quality Improvement Tools   | 3       |
| MFG 102   | Basic Machining Processes                   | 3       |
|           | <b>Total Credits: 12</b>                    |         |

## Engineering Technology Certificate (continued)

### First Year – Spring/Summer Session

| Course #              | Course Title  | Credits |
|-----------------------|---|---------|
| English Communication | Select a General Education English Communication course | 3       |
| Recommended:          | ENG 100 – Communication Skills                          |         |
| Social Science        | Select a General Education Social Science course        | 3       |
| Recommended:          | PSYCH 153 – Human Relations                             |         |
|                       | <b>Total Credits: 6</b>                                 |         |

### Electives

| Course #  | Course Title                                   | Credits |
|-----------|--|---------|
| CAD 130   | Geometric Dimensioning and Tolerance           | 3       |
| CAD 210   | CATIA – 3D and 2D Applications                 | 4       |
| CAD 220   | SolidWorks – 3D and 2D Applications            | 4       |
| CAD 230   | NX – 3D and 2D Applications                    | 4       |
| ELECT 131 | Basic Measurement and Reporting Skills         | 3       |
| MET 103   | Introduction to Materials Science              | 3       |
| MFG 105   | Manufacturing Processes                        | 4       |
| MFG 202   | Advanced Machining Processes                   | 3       |
| PLAST 130 | Introduction to Plastic Materials              | 3       |
| PLAST 131 | Introduction to Plastic Processing             | 3       |
| QM 107    | Quality Planning and Team Building             | 3       |
| ROBAT 101 | Robot Tool Handling Operations and Programming | 3       |
| WELD 110  | Introduction to Welding Basics for Fabrication | 3       |

### PROGRAM TOTAL 30 CREDITS

*\*Students planning to continue studies in pursuit of a certificate or Associate Degree are encouraged to select a course which can be applied to a future program of study. Discuss options with an academic advisor.*

## Engineering Technology AAS Degree

Schoolcraft program code # AAS.00273

This AAS Degree is designed to provide the student with knowledge of the practical application of principles, techniques, procedures, and equipment to the design and production of various goods and services. Engineering Technology graduates will be able to assist engineers in designing, developing, using, and maintaining all types of equipment. They will work independently or in teams doing product evaluation and testing, where they adjust, test, and repair equipment. Additionally, Technologists may be involved in the manufacturing, deployment, or servicing of equipment. With 16 elective credit options, the program can be customized to meet a student's or employer's interest. Students who graduate with this degree may consider transferring to another college or university to complete a Bachelor's degree in Engineering Technology.

There are two ways to complete the Engineering Technology AAS Degree:

1. The traditional route of completing all courses.
2. Individuals who have successfully completed the Department of Labor Apprenticeship Certificate, may be able to apply 21-45 credits toward the completion of an Engineering Technology AAS. Contact the Associate Dean of Occupational Programs in Engineering and Technology, and see below for further details.

All program required courses must be completed with a grade of 2.0 or better.

Not all courses are offered each semester. Students should work with an academic advisor to develop a schedule that will work for them. Students planning to transfer should check the transfer institution's requirements/guides or discuss their options with an academic advisor. Number of credits may vary depending on the course selection.

### SAMPLE SCHEDULE OF COURSES

#### First Year - Fall Semester

| Course #    | Course Title   | Credits |
|-------------|--|---------|
| ENGR 100    | <b>Introduction to Engineering and Technology</b>          | 3       |
| CIS 120     | <b>Software Applications</b>                               | 3       |
| Mathematics | <b>Select one:</b>   | 4       |
| MATH 102    | <b>Technical Mathematics</b>                               |         |
| MATH 113    | <b>Intermediate Algebra for College Students</b>           |         |
| OSH         | <b>Select one:</b>   | 2       |
| OSH 111     | <b>Occupational Safety and Health for General Industry</b> |         |
| OSH 112     | <b>Occupational Safety and Health for Construction</b>     |         |
|             | <b>Total Credits: 12</b>                                   |         |

#### First Year - Winter Semester

| Course # | Course Title                                       | Credits |
|----------|--|---------|
| CAD 120  | <b>Mechanical Blueprint Reading with Sketching</b> | 3       |
| Elective | <b>Select from list (minimum 3 credits)</b>        | 3       |
| QM 106   | <b>Introduction to Quality Improvement Tools</b>   | 3       |
| MFG 102  | <b>Basic Machining Processes</b>                   | 3       |
|          | <b>Total Credits: 12</b>                           |         |

## Engineering Technology AAS Degree (continued)

### First Year – Spring/Summer Session

| Course #              | Course Title  | Credits |
|-----------------------|---|---------|
| English Communication | Select a General Education English Communication course | 3       |
| Recommended:          | ENG 100 – Communication Skills                          |         |
| Social Science        | Select a General Education Social Science course        | 3       |
| Recommended:          | PSYCH 153 – Human Relations                             |         |
|                       | <b>Total Credits: 6</b>                                 |         |

### Second Year - Fall Semester

| Course #              | Course Title  | Credits |
|-----------------------|---|---------|
| MFG 105               | Manufacturing Processes                                 | 4       |
| MET 103               | Introduction to Materials Science                       | 3       |
| English Communication | Select a General Education English Communication course | 3       |
| Recommended:          | ENG 116 – Technical Writing                             |         |
| Elective              | Select from list (minimum 3 credits)                    | 3       |
| Humanities            | Select a General Education Humanities course            | 1-3     |
| Recommended:          | COMA 103 – Fundamentals of Speech                       |         |
|                       | <b>Total Credits: 14-16</b>                             |         |

### Second Year - Winter Semester

| Course # | Course Title  | Credits |
|----------|---|---------|
| WELD 110 | Introduction to Welding Basics for Fabrication                              | 3       |
| Sciences | Select a General Education Science course                                   | 3-5     |
| Elective | Select from list so that AAS program total credits meets minimum 60 credits | 10      |
|          | <b>Total Credits: 16-18</b>   |         |



## Engineering Technology AAS Degree (continued)

### Electives

| <b>Course #</b> | <b>Course Title</b>                                      | <b>Credits</b> |
|-----------------|--|----------------|
| CAD 130         | <b>Geometric Dimensioning and Tolerance</b>              | 3              |
| CAD 210         | <b>CATIA – 3D and 2D Applications</b>                    | 4              |
| CAD 220         | <b>SolidWorks – 3D and 2D Applications</b>               | 4              |
| CAD 230         | <b>NX – 3D and 2D Applications</b>                       | 4              |
| ELECT 131       | <b>Basic Measurement and Reporting Skills</b>            | 3              |
| MFG 103         | <b>Basic Computer Numerical Control (CNC)</b>            | 3              |
| MFG 202         | <b>Advanced Machining Processes</b>                      | 3              |
| MFG 212         | <b>Coordinate Measuring Machine</b>                      | 2              |
| MFG 291         | <b>Manufacturing Internship</b>                          | 3              |
| PLAST 130       | <b>Introduction to Plastic Materials</b>                 | 3              |
| PLAST 131       | <b>Introduction to Plastic Processing</b>                | 3              |
| PLAST 140       | <b>Plastic Materials Testing</b>                         | 3              |
| PLAST 150       | <b>Plastic Injection Molding Technology</b>              | 3              |
| PLAST 160       | <b>Process Control Systems for Plastic Manufacturing</b> | 3              |
| QM 107          | <b>Quality Planning and Team Building</b>                | 3              |
| ROBAT 101       | <b>Robot Tool Handling Operations and Programming</b>    | 3              |
| WELD 113        | <b>Shielded Metal Arc Welding (S.M.A.W.)</b>             | 3              |
| WELD 115        | <b>Gas Metal Arc Welding (G.M.A.W./M.I.G.)</b>           | 3              |
| WELD 119        | <b>Gas Tungsten Inert Arc Welding (G.T.A.W./T.I.G.)</b>  | 3              |

**PROGRAM TOTAL 60-64 CREDITS**

## **Engineering Technology AAS Degree – with Department of Labor Apprenticeship Certificate**

This AAS Degree is designed to allow students who possess a Department of Labor Apprenticeship Certificate to apply a minimum of 21 credits of their prior learning experiences toward the credits needed for the Engineering Technology AAS degree. Additional credits, based on professional experience and other courses completed, may be applied on a case-by-case basis, not to exceed 45 credits total. Contact the Associate Dean of Occupational Programs in Engineering and Technology for further details.

### **The following courses will be accepted as completed based on completion of the Department of Labor Apprenticeship Certificate (21 credits):**

- All Electives (16 credits)
- ENGR 100 – Introduction to Engineering and Technology (3 credits)
- OSH 111 – Occupational Safety and Health for General Industry or OSH 112 - Occupational Safety and Health for General Industry (2 credits)

### **Remaining program required technical courses (26 credits):**

- CIS 120 – Software Applications (3 credits)
- MATH 102 – Technical Mathematics or MATH 113 – Intermediate Algebra for College Students (4 credits)
- CAD 120 – Mechanical Blueprint Reading with Sketching (3 credits)
- MET 103 – Introduction to Materials Science (3 credits)
- QM 106 – Introduction to Quality Improvement Tools (3 credits)
- MFG 102 – Basic Machining Processes (3 credits)
- MFG 105 – Manufacturing Processes (4 credits)
- WELD 110 – Introduction to Welding Basics for Fabrication (3 credits)

### **Remaining program required general education courses (minimum 13 credits):**

- English Communication (6 credits)
  - Recommended: ENG 100 – Communication Skills (3 credits)
  - Recommended: ENG 116 – Technical Writing (3 credits)
- Social Science (3 credits)
  - Recommended: PSYCH 153 – Human Relations (3 credits)
- Humanities (1-3 credits)
  - Recommended: COMA 103 – Fundamentals of Speech (3 credits)
- Science (3-5 credits)

## Associate in Engineering Degree

Schoolcraft program code # AE.00039

Schoolcraft's Associate of Engineering degree is designed for students who intend to pursue a Bachelor's degree in engineering. It allows the student to establish a strong academic foundation in mathematics and science and complete courses to fulfill general education requirements—all before moving on to a Bachelor's degree program at another college or university.

- Civil, chemical, computer systems, electrical, environmental, industrial, and mechanical engineering are among the most popular Bachelor's degrees, although there are more than 25 recognized specialties.
- Schoolcraft's degree can prepare the student for transfer into any engineering specialty.
- The specific courses required will be determined by the destination college or university and/or the student's intended major.
- Students must work with an academic advisor to ensure that their courses transfer.

All courses must be completed with a minimum overall grade point average of 2.0 or better.

Not all courses are offered each semester. Students should work with an academic advisor to develop a schedule that will work for them. Students planning to transfer should check the transfer institution's requirements/guides or discuss their options with an academic advisor. Number of credits may vary depending on the course selection.

### SAMPLE SCHEDULE OF COURSES

#### First Year - Fall Semester

| Course #              | Course Title  | Credits |
|-----------------------|---|---------|
| English Communication | Select first within a set of General Education English Communication courses* | 3       |
| Recommended:          | ENG 101 – English Composition 1   |         |
| ECON                  | Select one:   | 4       |
| ECON 201              | Principles of Macroeconomics  |         |
| ECON 202              | Principles of Microeconomics  |         |
| MATH 150              | Calculus with Analytic Geometry 1   | 5       |
| CHEM 111              | General Chemistry 1   | 4       |
|                       | <b>Total Credits: 16</b>  |         |

#### First Year - Winter Semester

| Course #              | Course Title   | Credits |
|-----------------------|--|---------|
| English Communication | Select second within a set of General Education English Communication courses* | 3       |
| Recommended:          | ENG 102 – English Composition 2 OR   |         |
|                       | ENG 116 – Technical Writing  |         |
| MATH 151              | Calculus with Analytic Geometry 2  | 5       |
| PHYS 211              | Physics for Scientists and Engineers 1   | 5       |
| Humanities            | Select General Education Humanities course*                                    | 3       |
|                       | <b>Total Credits: 16</b>   |         |

## Associate in Engineering Degree (continued)

### Second Year – Fall Semester

| Course #       | Course Title                                    | Credits |
|----------------|---|---------|
| MATH 240       | Calculus with Analytic Geometry 3               | 5       |
| PHYS 212       | Physics for Scientists and Engineers 2          | 5       |
| Social Science | Select General Education Social Science course* | 3       |
| Humanities     | Select General Education Humanities course*     | 1       |
|                | <b>Total Credits: 14</b>                        |         |

### Second Year - Winter Semester

| Course #     | Course Title  | Credits |
|--------------|---|---------|
| MATH 252     | Differential Equations  | 5       |
| Electives    | Select liberal arts or occupational courses that satisfy transfer and academic goals and requirements.* | 9       |
| Recommended: | ENGR 201 – Statics OR   |         |
|              | ENGR 202 – Mechanics of Materials OR  |         |
|              | ENGR 203 – Dynamics   |         |
|              | <b>Total Credits: 14</b>  |         |

## PROGRAM TOTAL 60 CREDITS

\*Please check Schoolcraft General Education and transfer institution program requirements to determine course options.