

Program Review

**Engineering Technology (ENT) Program
Associate in Applied Science (AAS), Certificate (CER), Short-Term Certificate (STC) (CIP: 150000)**

Program Purpose

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| What is the published purpose/mission of the program? |
| The purpose of the Engineering Technician Program is to provide learning experiences for student to gain knowledge, skills, and abilities necessary for employment as an engineering technician. |
| How does the program's purpose/mission fit into the overall mission of the college? |
| This program supports mission goals three, five, and seven as well as directive goals two, three and four. |
| Do any changes need to be made to the program's purpose/mission? Explain. |
| No. The ENT program has kept track with local industry needs. |
| Do any changes need to be made to how the program's purpose/mission fits into the overall college mission? Explain. |
| No. The ENT program's purpose is to provide the knowledge, skills, and experience necessary for local residents to improve their lives and their communities. |

Program Learning Outcomes

| What are the program learning outcomes, and how are they assessed? | |
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| Outcome | Assessment |
| The student will function as a competent entry-level engineering technician by demonstrating knowledge and skills retained from coursework. | In ADM 150-154, the student, as part of a team, will demonstrate his/her ability to function as a competent entry-level engineering technician by completing a co-operative education experience. The student will be evaluated on Measurable Learning Outcomes at midterm and final by his/her employment supervisor. The student will also be examined using the NOCTI Engineering Tech comprehensive evaluation. |
| The student will perform tasks in a safe manner. | In ADM 150-154, throughout the co-operative work experience, the student will perform tasks in a safe manner with 100% proficiency according to the standardized Occupational Safety and Health Rubric. |
| The student will exhibit a positive work ethic. | In ADM 150-154, the student's work ethic will be assessed by his/her co-operative experience employment supervisor using a standardized Workplace Readiness Skills Rubric. |
| What can students do with the knowledge they have after completing the program? | |
| At the end of the program, students are qualified to be employed in manufacturing, construction, research, and consulting. | |
| What are the plans for reviewing the program learning outcomes and revising them? | |
| Program learning outcomes are revised as the program changes to meet the needs of local industry. | |

Assessed Needs and Assumptions

What are the occupational projections for careers for which the program trains?

| Quick Facts: Civil Engineering Technicians | |
|--|---------------------------------------|
| <u>2018 Median Pay</u> | \$52,580 per year \$25.28 per hour |
| <u>Typical Entry-Level Education</u> | Associate's degree |
| <u>Work Experience in a Related Occupation</u> | None |
| <u>On-the-job Training</u> | None |
| <u>Number of Jobs, 2018</u> | 73,800 |
| <u>Job Outlook, 2018-28</u> | 5% (As fast as average) |
| <u>Employment Change, 2018-28</u> | 3,700 |

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Civil Engineering Technicians, on the Internet at <https://www.bls.gov/ooh/architecture-and-engineering/civil-engineering-technicians.htm> (visited April 12, 2020).

| Quick Facts: Electrical and Electronics Engineering Technicians | |
|--|---------------------------------------|
| <u>2018 Median Pay</u> | \$64,330 per year \$30.93 per hour |
| <u>Typical Entry-Level Education</u> | Associate's degree |
| <u>Work Experience in a Related Occupation</u> | None |
| <u>On-the-job Training</u> | None |
| <u>Number of Jobs, 2018</u> | 130,500 |
| <u>Job Outlook, 2018-28</u> | 0% (Little or no change) |
| <u>Employment Change, 2018-28</u> | 200 |

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Electrical and Electronics Engineering Technicians, on the Internet at <https://www.bls.gov/ooh/architecture-and-engineering/electrical-and-electronics-engineering-technicians.htm> (visited April 11, 2020).

| Quick Facts: Mechanical Engineering Technicians | |
|--|---------------------------------------|
| <u>2018 Median Pay</u> | \$56,250 per year \$27.04 per hour |
| <u>Typical Entry-Level Education</u> | Associate's degree |
| <u>Work Experience in a Related Occupation</u> | None |
| <u>On-the-job Training</u> | None |
| <u>Number of Jobs, 2018</u> | 42,600 |
| <u>Job Outlook, 2018-28</u> | 3% (Slower than average) |
| <u>Employment Change, 2018-28</u> | 1,100 |

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Mechanical Engineering Technicians, on the Internet at <https://www.bls.gov/ooh/architecture-and-engineering/mechanical-engineering-technicians.htm> (visited April 09, 2020).

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| Based on the occupational projections, what is the employment outlook for graduates of the program? |
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| According to the Bureau of Labor Statistics information above, the growth potential is less than average. However, the need for engineering technicians in the Huntsville area continues. |
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| What is the outlook for the continued need of the program within the mission of the college? |
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| Since the program continues to place students in surrounding areas, the need for the program remains. |
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Structure**What credentials does the program offer?**

The Engineering Technician Program offers the following credentials:

- Associate in Applied Science Degree in Engineering Technician
- Certificate in Engineering Technician
- Short-Term Certificate in Engineering Technician

What are the requirements for each credential?

| AAS in Engineering Technician |
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| Area I: Written Composition (3 hours total) |
| ENG 101—English Composition I (3 hours) |
| Area II: Humanities and Fine Arts (6 hours total) |
| SPH 107—Fundamentals of Public Speaking (3 hours) |
| Humanities and Fine Arts Elective (3 hours) Choose from ART 100, 203, 204; MUS 101; PHL 206; REL 100, 151, 152; SPA 201, 202; THR 120, 126 |
| Area III: Natural Science and Mathematics (10 hours total) |
| MTH 112 Pre Calculus Algebra (3 hours) |
| CIS 146 or CIS 251 (3 hours) |
| PHY 201 General Physics I Trig-Based (4 hours) |
| Area IV: History, Social, and Behavioral Sciences (3 hours total) |
| Area IV Elective (3 hours) Choose from: ECO 231, 232; GEO 100; HIS 101, 102, 201, 202; POL 211; PSY 200, 210; SOC 200, 210 |
| Area V: Pre-Professional, Major, and Elective Courses (54 hours total) |
| EGR 101 Engineering Foundations (3 hours) |
| ENT 106 Principles of Engineering Tech (3 hours) |
| ENT 140 Applied Statics (3 hours) |
| ENT 221 Quality and Productivity (3 hours) |
| ENT 222 Introduction to Project Management (3 hours) |
| ILT 160 DC Fundamentals (3 hours) |
| ILT 161 AC Fundamentals (3 hours) |
| INT 119 Principles of Mechanical Measurement and Tech Drawing (3 hours) |
| MTH 113 Pre Calculus Trig (3 hours) |
| WKO 106 Workplace Skills (3 hours) |
| WKO 110, 131, 132, 133, or 134 (3 hours) |
| Cooperative Education Electives (3 hours) Choose from ADM 150, 151, 152, 153, or 154 |
| DDT or MDT Elective Sequence (6 hours) |
| Program Advisor-approved Electives (12 hours) |
| Total Hours Required for Degree: 76 hours |
| Certificate in Engineering Technician |
| ENG 101—English Composition I (3 hours) |
| SPH 107—Fundamentals of Public Speaking (3 hours) |
| CIS 146 or CIS 251 (3 hours) |
| WKO 131 or MSSC Safety Course (3 hours) |
| PHY 201 General Physics I Trig-Based (4 hours) |

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| EGR 101 Engineering Foundations (3 hours) |
| ENT 106 Principles of Engineering Tech (3 hours) |
| ENT 140 Applied Statics (3 hours) |
| ILT 160 DC Fundamentals (3 hours) |
| ILT 161 AC Fundamentals (3 hours) |
| INT 119 Principles of Mechanical Measurement and Tech Drawing (3 hours) |
| MTH 112 Pre Calculus Algebra (3 hours) |
| MTH 113 Pre Calculus Trig (3 hours) |
| DDT or MDT Elective Sequence (6 hours) |
| Total Hours Required for Certificate: 46 hours |
| Short – Term Certificate in Engineering Technician |
| EGR 101 Engineering Foundations (3 hours) |
| ENT 106 Principles of Engineering Tech (3 hours) |
| INT 119 Principles of Mechanical Measurement and Tech Drawing (3 hours) |
| ILT 160 DC Fundamentals (3 hours) |
| ILT 161 AC Fundamentals (3 hours) |
| Program Advisor-approved Electives (12 hours) |
| Total Hours Required for Short – Term Certificate: 27 hours |

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| How often are the requirements for the degree reviewed? |
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| Annually with the Advisory Committee. |
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| Are there any plans for revising the degree requirements? |
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| The ENT degree plan has been revised almost every year since 2011. It will continue to be revised as needed and determined by the Advisory Committee. |
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Accreditation

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| What is the institutional accreditation for the program? |
| The Engineering Technology program is within the institutional accreditation granted by the SACSCOC and reaffirmed in 2015. |
| Does the program have any program-specific accreditations? |
| No |

Instructors

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| Who are the current instructors in the program, and what are their credentials? | |
| Name | Degree/Qualifications |
| Deni Adkins, P.E. | <ul style="list-style-type: none"> • BS Mechanical Engineering, UAH • MS Engineering Management, UAH • P.E. Licensure |
| Roger Smith | <ul style="list-style-type: none"> • BS Mechanical Engineering |
| Kelly Black | <ul style="list-style-type: none"> • BS Architecture, Auburn University • MBA, Faulkner University |
| Barry Wigley | <ul style="list-style-type: none"> • AS, NACC • BS, Athens State University |
| Dennis Lester | <ul style="list-style-type: none"> • AAS Industrial Electronics, NACC |

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| How have the instructors in the program developed professionally over the past two years? |
| 2017-2018 |
| MSSC Safety MSSC Production MSSC Quality MSSC Maintenance MSSC Green |
| 2018-2019 |
| OSHA 511 |
| What are any planned professional development activities for instructors in the program? |
| NC3 Train-the-Trainer in Precision Measurement and Mechatronics. |
| Are any additional instructors anticipated within the next five years? If so, please explain. |
| Should enrollment increase, a night program would require at least one additional instructor. |

Instructional Quality and Enhancements/Curriculum Design

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| How is the general education core incorporated into the course of study for this program? |
| The AAS degree includes 22 credit hours of general education in the 76 credit-hour total: ENG 101; SPH 107; three credit hours of humanities or fine arts; MTH 112; CIS 146 or 251; four hours of PHY 201; and three credit hours of history, social, or behavioral sciences. |
| Are all course syllabi current and posted on the NACC website? Explain. |
| All course syllabi are being standardized and updated on the NACC website. |
| How is curriculum of each program option evaluated to ensure it is relevant and current? Examples include advisory committee suggestions, student learning outcome evaluations, student evaluations, etc. |
| Advisory Committee reviews the curriculum annually. |
| Describe changes that have been made in the delivery of the courses in each option of the program as a result of review of the program learning outcomes over the last five years. |
| Although much of the work is lab based, all course information, announcements, assignments, documents, and web links are available online in the LMS for clarity. Direct communication with students is accomplished using Remind.com, since it goes directly to students' cell phones. |
| Are courses in the program scheduled to maintain availability and accessibility in accordance with the college's mission? Explain. |
| Yes. |

Program Resources

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| Describe the physical facilities and resources, including any laboratories, used in the program. Are the physical facilities and resources adequate? Explain. |
| Physical facilities are on campus and of excellent quality. The ENT program makes use of the existing drafting program facilities as well as those of the industrial electronics program, the industrial maintenance program, and the physics lab. |
| Are there any plans for major expansion or upgrade of facilities or major replacement/expansion of equipment? Explain the rationale and include projected costs. |
| No. |
| Describe the technological resources used in the program. Are the technological resources adequate? Explain. |
| <ul style="list-style-type: none"> • VEX Robots • Digital Sensors and Data Collection Equipment • Materials Testing Equipment • Material Properties S/W • Materials Heat Treating Equipment • Metal Casting Equipment • Force Tables • Structures Trainer • Mechanisms Trainers • Project Management Software • Precision Measuring Equipment • 2D and 3D Drafting and Design Computers/SW • 3D Printing Lab • PLC Equipment/SW • Motor Controls Trainers • Hydraulics Trainers • Robot Trainers/SW |
| Are there any plans for major expansion or upgrade of technological resources? Explain the rationale and include projected costs. |
| A small mechatronics addition is being investigated currently. No costs are available at this time. |
| Describe the library resources that are available to the program. |
| Examples of library resources provided by the NACC Learning Resources Center include the following: books, eBooks (full-text electronic books), and full-text journal, magazine, and newspaper articles. Depending on format, these items may be accessed electronically or in print. Online tutorials, as well as program-specific LibGuides pages, provide instruction in the use of these resources. Library staff are available to assist students and faculty in person, online, and by phone. |
| Are the library resources adequate for the program? Explain. |
| Yes |
| Are there any plans for expansion or upgrade of library resources for the program? Explain the rationale and include projected costs. |
| N/A |

Advisory Committee

Is an advisory committee in place for the program? If so, list the committee members and their affiliation in the community. If not, are plans in place to establish an advisory committee?

Dr. David Campbell, NACC
Dr. Mike Kenamer, NACC
Mr. Kerry Wright, NACC
Mr. Ronny Kisor, ATN
Mr. Chris Anderson, ATN
Mr. Roger Dukes, GH Metals
Mr. Eric Chambers, GH Metals
Mr. Erik Buatte, ERC
Mr. Bradley Chandler, Scottsboro WSG
Mr. David Hulse, Siemens
Mr. John Smith, Heil
Mr. Mark Cather, Lozier
Mr. Ron Chambless, Lozier
Ms. Charlotte Kilgore, Gill Industries

What is the purpose and role of the advisory committee?

The role of the advisory committee is to maintain academic and lab experiences that prepare students to step into local industry positions.

Describe any changes that have been made to the program as a result of advisory committee activity or suggestions.

- Math and Physics were upgraded
- Project Management was added as a core course
- Materials Selection is suggested as an elective for all students
- Electives like Intro to Motor Controls, Programmable Logic Controllers, Hydraulics and Pneumatics have been included as electives

Enrollment and Completions

What are the enrollment trends in the program over the last five years?

| Number of Students Enrolled in ENT Courses AY 2014-2015 through AY 2018-2019 | | | | |
|--|-----------|-----------|-----------|-----------|
| 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 |
| 18 | 25 | 20 | 13 | 16 |

Source: Office of Institutional Planning and Assessment. NACC ACCESS/400 database system. March 5, 2020.

What are the enrollment trends in the program over the last five years by gender?

| Number of Students Enrolled in ENT Courses by Gender AY 2014-2015 through AY 2018-2019 | | | | | |
|---|-----------|-----------|-----------|-----------|-----------|
| | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 |
| Male | 14 | 21 | 19 | 12 | 13 |
| Female | 4 | 4 | 1 | 1 | 3 |
| Total | 18 | 25 | 20 | 13 | 16 |

Source: Office of Institutional Planning and Assessment. NACC ACCESS/400 database system. March 5, 2020.

What are the enrollment trends in the program over the last five years by race/ethnicity?

| Number of Students Enrolled in ENT Courses by Race/Ethnicity AY 2014-2015 through AY 2018-2019 | | | | | |
|---|-----------|-----------|-----------|-----------|-----------|
| | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 |
| African American | 1 | - | - | - | - |
| Asian | - | - | - | - | - |
| Hispanic | 1 | - | 1 | - | 3 |
| Native American | - | - | 1 | - | 1 |
| Other | - | - | - | - | - |
| White | 16 | 25 | 18 | 13 | 12 |
| Total | 18 | 25 | 20 | 13 | 16 |

Source: Office of Institutional Planning and Assessment. NACC ACCESS/400 database system. March 5, 2020.

What are the total number of enrollments and credit-hour production over the last five academic years?

| Total Enrollments and Credit-Hour Production ENT Courses AY 2014-2015 through AY 2018-2019 | | | | | |
|--|-----------|-----------|-----------|-----------|-----------|
| | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 |
| Total Enrollments | 26 | 54 | 32 | 29 | 21 |
| CHP | 78 | 152 | 96 | 84 | 63 |

Note: Total Enrollments is a duplicated headcount. If a student enrolled in more than one CRJ course, that student is counted multiple times.

Source: Office of Institutional Planning and Assessment. NACC ACCESS/400 database system. March 5, 2020.

What are the course success and retention rates in the program over the last three academic years?

| Course Success and Retention Rates ENT Courses AY 2016-2017 through AY 2018-2019 | | | | | | | | | |
|--|-------------|-----------------|-------|--------------|------|-----------------|-------|--------------------|-------|
| Year | Enrollments | Withdrawal Rate | | Failure Rate | | Pass Rate (A-D) | | Success Rate (A-C) | |
| | | No. | % | No. | % | No. | % | No. | % |
| 2016-2017 | 32 | 2 | 6.3% | 1 | 3.1% | 29 | 91% | 26 | 81% |
| 2017-2018 | 28 | 3 | 10.7% | 0 | 0% | 25 | 89.3% | 22 | 78.6% |
| 2018-2019 | 21 | 5 | 25% | 3 | 14% | 13 | 61.5% | 13 | 61.5% |

Source: Office of Institutional Planning and Assessment. NACC ACCESS/400 database system. March 5, 2020.

What do the data indicate about enrollment and student retention in the program?

What are the plans for increasing enrollment and retention rates in the program?

In an effort to increase enrollment, a comparison was made between the traditional 4-5 yr program of Engineering Transfer AS and then Engineering BS versus a process of AAS/professional level work with AA and BS completion (so that a student could earn a professional level wage in an engineering position while he/she completes BSE degree requirements). Incredibly, considering ONLY earnings, the ENT graduate who goes on to complete a BSE on a part time basis while working full time actually EARNs over \$100,000 over the same 8-year timeline than the tradition BSE pathway graduate. This information is being distributed to Engineering Transfer advisors as well as high school counselors.

How many students have earned a credential in the program in the last five academic years?

| Completers in Engineering Technology AY 2014-2015 through AY 2018-2019 | | | | | |
|--|-----------|-----------|-----------|-----------|-----------|
| Credential | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 |
| AAS | 7 | 2 | 2 | 2 | 2 |
| CER | 6 | 8 | 2 | 5 | 2 |
| STC | 1 | 9 | 5 | 1 | 12 |

Note: A student who earned multiple awards is counted in all applicable rows.

Source: Office of Institutional Planning and Assessment. NACC ACCESS/400 database system. March 5, 2020.

What are the plans for increasing the completion rates in the program?

The ENT program is very challenging. In addition to personal interaction and SAGE reporting, a student data form detailing essential functions was developed at the last ENT Advisory Committee meeting. Future incoming students will be required to study and sign this form, making them aware of the physical demands, problem-solving abilities, and worker characteristics of engineering techs.

Licensure passage rates

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| Does the program lead to the opportunity for licensure? If so, what are the licensure opportunities? |
| No. |
| What are the licensure pass rates, if applicable? |
| N/A |
| Does the program or any coursework in the program lead to any type of industry certification? If so, what are the certifications? |
| OSHA 10 hr cert, MSSC Safety cert, ETA DC Electricity cert, ETA AC Electricity cert, NOCTI Engineering Tech cert |
| What are the industry certification pass rates, if applicable? |
| There are no industry certifications, but there were 12 short term certificates issued in this program in the 18-19 academic year. |

Job Placement Rates and Employer Satisfaction

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| What are the job placement rates for graduates of the program? |
| Since the ENT program requires a co-op semester, job placement rates are 100% |
| Is employer satisfaction of graduates assessed? If so, are employers satisfied with graduates of the program? Please describe. |
| Employers are queried as to their satisfaction of ENT graduates. Currently employers are very satisfied with the level and variety of instruction and experience ENT graduates possess. |

Student Follow-Up Reports

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| Is student satisfaction with the program assessed? If so, are students in the program satisfied with the program? Please describe. |
| Student satisfaction among NACC students as a whole is assessed, but there are no specific assessments with the ENT program. |
| Is alumni satisfaction with the program assessed? If so, are alumni of the program satisfied with the program? Please describe. |
| NACC alumni continue to offer positive feedback across the institution as a whole. There is no specific ENT alumni assessment. |

Findings of Review THIS IS THE MOST IMPORTANT PART OF THE PROGRAM REVIEW!

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| What are the strengths of the program? |
| The strengths of the Engineering Tech program include, but aren't limited to, the following: <ul style="list-style-type: none"> • Highly qualified and industry-experienced faculty • ENT incorporates DDT, ILT, and INT faculty, courses, and equipment • Wide knowledge base of mechanical, electrical, and industrial quality core and electives • High academic rigor • Balanced academics/hands-on components • Work experience requirement |
| What are recommendations for improvement? |
| We will continue to try and increase both enrollment and completions within the program. |
| Please provide any other findings that are pertinent to the review. |
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Report Affirmed by:

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| Signed | <p>SIGNATURES ON FILE IN OFFICE OF INSTITUTIONAL PLANNING AND ASSESSMENT</p> | |
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