MARYLAND HIGHER EDUCATION COMMMISSION
ACADEMIC PROGRAM PROPOSAL

PROPOSAL FOR:

X **NEW INSTRUCTIONAL PROGRAM**

____ **SUBSTANTIAL EXPANSION/MAJOR MODIFICATION**

____ **COOPERATIVE DEGREE PROGRAM**

X **WITHIN EXISTING RESOURCES or** ____ **REQUIRING NEW RESOURCES**

(For each proposed program, attach a separate cover page. For example, two cover pages would accompany a proposal for a degree program and a certificate program.)

Hagerstown Community College
Institution Submitting Proposal

Spring 2017
Projected Implementation Date

AAS
Award to be Offered

Electrical Engineering Technology
Title of Proposed Program

5311.01
Suggested HEGIS Code

15.0403
Suggested CIP Code

Technology and Computer Studies
Department of Proposed Program

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Signature and Date
President/Chief Executive Approval

May 24, 2016
Date
Date Endorsed/Approved by Governing Board

Academic Program Proposal for Electrical Engineering Technology, A.A.S.

Hagerstown Community College

A. Centrality to institutional mission statement and planning priorities:

1. Provide a description of the program, including each area of concentration (if applicable), and how it relates to the institution's approved mission.

The proposed Associate of Applied Science degree in Electrical Engineering Technology (EET) is a 60 credit hour program that is a revitalization of a previous EET degree which was discontinued in 2008. The new program incorporates an existing HCC certificate in Basic Electronics. Incorporating this certificate creates a stackable credential resulting in a pathway to a job as well as degree completion.

The AAS in Electrical Engineering Technology program prepares students for careers as electrical engineering technicians who assist engineers in the maintenance, installation, design, fabrication and testing of electrical and electronic devices and systems. Students in the program will obtain the scientific, electrical, and technical engineering skills necessary to function as contributing members of engineering teams.

The new program will include updated courses from the previous degree, as well as new courses to include Microprocessors & Microcontrollers, Electronic Communications Systems, Advanced Electronics, and Circuit Design & Analysis. Over the last ten years there has been an increase in the number of companies and industry partners that use/need competent electrical engineering technicians. As this sector grows, demand for Electrical Engineering Technicians will increase.

The HCC mission focuses on the outcomes of students enrolled in programs. Two of the central purposes of Hagerstown Community College identified in the mission statement are 1) to offer programs designed for "career entry or advancement" and 2) to "foster regional economic development." The proposed Associate of Applied Science in Electrical Engineering Technology addresses both of these purposes by educating students to join a growing and changing workforce in diverse employment opportunities, such as engineering firms, advanced manufacturing facilities, distribution and logistics companies, industrial facilities, health services, information services and technologies, and electrical companies. Hagerstown and the surrounding area is home to many such employers, including First Energy, RHL Engineering, LS Grimm, Washington County Government, Volvo, Staples, TB Woods, CertainTeed, JLG, Hagerstown Regional Airport, First Data, as well as several smaller engineering firms.

Electrical Engineering Technicians need specific technical skills which are essential to build, operate, and troubleshoot electrical and electronic equipment. These skills include analyzing circuits, schematics, and test equipment, electro-mechanical motion and robots, programmable logic controllers, electricity/digital instrumentation, mechanical systems, electrical control systems, pneumatics, industrial power electronics, and hydraulics.

2. Explain how the proposed program supports the institution's strategic goals and provide evidence that affirms it is an institutional priority.

Hagerstown Community Colleges' 2016 Strategic Plan Strategic Goal 2, "Maintain a Responsive, Dynamic Curriculum and Teaching Excellence," directly aligns with the development of a program in Electrical Engineering Technology. Sub-goal 2.4 focuses on the college's need to support industrial technology and program laddering in the technical fields.

The curriculum was designed by HCC faculty and administration who have years of industry experience and who worked closely with industry partners as well as advisory board members. During the past year, HCC has hired three full-time instructors in the areas of Alternative Energy, Industrial Technology, and Electrical Engineering to sustain and promote degrees in the STEM manufacturing and electrical fields. One of those full-time faculty members will become the program coordinator for the new EET program upon approval of the degree.

The College is currently completing a renovation of the electronics lab. The renovations will be completed by the start of the fall semester. Students who complete the Basic Electronics certificate this fall and/or spring will be able to move seamlessly into the EET degree.

B. Adequacy of curriculum design and delivery to related learning outcomes consistent with Regulation .10 of this chapter:

1. Provide a list of courses with title, semester credit hours and course descriptions, along with a description of program requirements.

Students in the AAS Electrical Engineering Technology program will take 35 program requirement credits, 6 elective credits, and 19 general education credits for a total of 60 credits. Program courses are as follows:

ELE-101 Device Data System Architectures 3 credits

Students will learn the concepts of basic industrial device networking protocols and architectures. The course covers the essentials of PLC, PAC, Device and SCADA communication systems. Students will be given a brief overview of the fundamentals of interfacing systems, including hardware, software, and communication systems, as well as hands on configuration experience and trouble-shooting techniques.

ELE-103 Analog and Digital Electronics 3 credits

Students will learn the principles of analog and digital circuits to include: logic gates, counting circuits, registers, A/D and D/A converters. Study includes transistors, diodes, thyristors, operational amplifiers, timers, phase-locked loops, voltage regulators, amplifiers, oscillators, numbering systems, logic design, sequential and combination logic, and digital troubleshooting.

ELE-110 **Fundamentals of Electricity** **4 credits**

This is a basic electricity course that includes both DC and AC circuits. The course has been designed for those students who need an understanding of electrical principles and applications but do not need the theoretical or mathematical depth required for electronic circuit design. Lab exercises deal with many of the practical applications of electricity along with learning to use test equipment for the purpose of circuit diagnosis and troubleshooting.

ELE-158 **Circuits, Schematics, and Test Equipment** **3 credits**

This course teaches students how to recognize, interpret, and troubleshoot electrical and electronic circuits through symbol identification and to use a variety of test instruments. Students will learn to effectively solve problems though critical thinking, logical and root cause analysis. Electrical standards for circuit structure using NFPA79, IEEE, and IEC Standards, as well as ANSI and IEC codes and symbols will be emphasized.

INT-102 **Introduction to PLCs** **3 credits**

This is a beginning, hands-on course in programmable logic controllers (PLCs). The course teaches students the hardware configurations of a typical PLC application, as well as introduces students to Rockwell Automation RSLogix and Siemens S7 Programming Software. Topics include discrete ladder logic relay-type instructions, timers, counters, sequencers, sub-routines, move instructions, and math functions. It is excellent for development of multi-skilled technicians as well as electricians and engineers who wish to update their skills.

INT-104 **Facilities Safety and Compliance** **3 credits**

The building, safety, health, and environmental regulations that apply to industrial, commercial, and municipal facilities will be examined. Students will develop a working knowledge of procedures to follow when encountering and/or interacting with regulatory authorities such as Code officers/inspectors, EPA, ADA, and OSHA.

ELE-105 **Microprocessors & Microcontrollers** **3 credits**

In this course students will study the basics of microprocessors/microcontrollers and their applications in industry. A number of topics are covered, including: programming (instructions sets and assembly language), hardware configurations, pin functions, modes of operation, and basic input/output timing, control and memories. The goal is for students to be able to design, analyze, and program microprocessors/microcontrollers.

ELE-204 **Electrical Machines** **3 credits**

In this course, students will learn industrial electric motors, generators, and transformers. Topics include three-phase circuits, saturation and hysteresis, eddy currents/losses, DC motors, AC motors, synchronous machines, induction machines, and the properties of various types of transformers.

ELE-206 **Electronic Communications Systems** **3 credits**

This course teaches students electronic communication circuits and systems, as it applies to typical industry systems. Students will study electro-magnetic frequency spectrum, resonant waveforms, LC circuits, band-pass filters, power and tuned voltage amplifiers, and oscillators. Topics covered also include bandwidth allocations, AM, FM, SSB modulations, antennas, SCADA and satellite systems.

ELE-207 **Advanced Electronics/Electricity** **3 credits**

This course builds on previously covered material, including circuits (AC/DC), electronics, PLCs, digital circuits, and microprocessors. Students will analyze and troubleshoot circuits and systems, as well as, design and build circuits typically found in industry.

ELE-208 **Advanced Digital Circuit Design and Analysis** **4 credits**

This course teaches students digital electronics – on a component level and how digital circuits work. Students will study number systems, Boolean algebra, logic gates, flip-flops, counters, encoders, multiplexers, digital-to-analog (DAC) converters, and analog-to-digital converters (ADC). Upon completion of this course, students will be able to design, build, and troubleshoot various circuits commonly used in industry.

Electives **Choose an elective in consultation with an advisor** **6 credits**

Students choose an elective in consultation with an advisor. Recommended electives are ELE-140 Robotics, ELE-215 SPC and Device Systems Management, and ELE-113 Instrumentation and Process Control I.

2. Describe the educational objectives and intended student learning outcomes.

A.A.S. Electrical Engineering Technology Student Learning Outcomes	
Outcome	**Justification**
Students will obtain the scientific, electrical, and technical engineering skills necessary to function as contributing member of engineering teams.	Because electrical engineering technicians often work with team members without an engineering background, they must be able to present complex ideas and relay instruction to others and must be able to apply academic knowledge to new tasks and keep up with rapid changes in technology.
Students will obtain specific technical skills that are essential to build, operate, and troubleshoot electrical and electronic equipment.	Electrical engineering technicians must be able to follow a logical sequence or specific set of rules to carry out engineers' designs, inspect designs for quality control, and put together prototypes.
Students will demonstrate the ability to analyze circuits, schematics, and test equipment; electro-mechanical motion and robots; programmable logic controllers; electricity/digital instrumentation, mechanical systems, electrical control systems, pneumatics, industrial power electronics and hydraulics.	Electrical engineering technicians must isolate and then identify problems for the engineering staff to work on. They need good reasoning skills to identify and fix problems.
Students will demonstrate their understanding of teamwork, critical thinking and root cause analysis.	Electrical engineering technicians create what engineers have designed and often test the design to make sure that they work and help resolve any problems that may arise.
Students will demonstrate an understanding of the advanced and complex electrical systems on which equipment operates and communicates.	Electrical engineering technicians are responsible for testing and troubleshooting and are responsible for evaluating projects and reporting problems to engineers.
Students will be able to conduct product evaluation and testing, use measuring and diagnostic devices to adjust, test, and repair equipment, as well as work in the manufacture and deployment of equipment for automation.	Electrical engineering technicians in particular must be able to use hand tools and soldering irons on small circuitry and electronic parts to create detailed electronic components by hand.
Apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.	Electrical engineering technicians must write reports pertaining to the results of testing, or problems they find when carrying out designs. Their writing must be clear and well organized so that their counterparts and team members that they work with can understand the reports.
Understand applications of physics or chemistry to electrical/electronic(s) circuits in a rigorous mathematical environment at or above the level of algebra and trigonometry.	Electrical engineering technicians use math for analysis and design, and apply their knowledge of science, engineering and technology to engineering technology problems that require the application of principles and applied procedures or methodologies when troubleshooting in their work.
Apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities.	Electrical engineering technicians conduct maintenance on various kinds of consumer, industrial, and specialized electronic devices, such as GPS systems, or the robotic arms used in factories. Maintenance may include recalibrating or monitoring a system to ensure proper functioning.

3. Discuss how general education requirements will be met, if applicable.

Students will take 19 credits of General Education, including:

Math General Education	3 credits
English General Education	3 credits
Arts & Humanities General Education	3 credits
Diversity General Education	3 credits
General Physics I	4 credits
Behavioral/Social Science General Education	3 credits

4. Identify any specialized accreditation or graduate certification requirements for this program and its students.

The AAS in Electrical Engineering Technology will not receive any specialized accreditation nor does it have certification requirements.

5. If contracting with another institution or non-collegiate organization, provide a copy of the written contract.

N/A

C. Critical and compelling regional or Statewide need as identified in the State Plan:

1. Demonstrate demand and need for the program in terms of meeting present and future needs of the region and the State in general based on one or more of the following:

HCC's program in Electrical Engineering Technology trains individuals to help engineers design, develop, install, maintain, and operate computers, communications equipment, medical monitoring devices, navigational equipment, manufacturing equipment, material handling, and other electrical and electronic equipment. The skills graduates will possess will enable them to conduct product evaluation and testing, use measuring and diagnostic devices to adjust, test, and repair equipment, as well as work in the manufacture and deployment of equipment for automation.

2. Provide evidence that the perceived need is consistent with the Maryland State Plan for Postsecondary Education (pdf).

The 2013 Maryland State Plan for Postsecondary Education identifies the importance of STEM degrees. "Increasing the number of STEM degrees awarded to students is another key goal for Maryland postsecondary education. STEM-related occupations are critical because they are closely tied to technological innovation, economic growth, and increased productivity. Currently, workers with STEM competencies and degrees are in high demand. Data from the Georgetown University Center for Education and the Workforce 2011 rank STEM jobs as the second fastest-growing occupational category in the nation, behind health care. This trend is expected to continue as the economy becomes more reliant on workers' skills and knowledge."[1]

The 2013 Maryland State Plan for Postsecondary Education calls for an increase in access, affordability, and completion, including "the expansion of early college access opportunities, particularly in STEM disciplines."[2] The EET degree will be one of the degree options available in our STEMM Middle College program. High school students from Washington County are able to enroll and complete an associates' degree while completing their high school diploma. In addition, the EET degree will also be offered in timeframes that are accessible to adult students who may already have jobs but who lack postsecondary credentials that would make them better candidates for employment.

Goal 5 of the 2013 Maryland State Plan for Postsecondary Education is Economic Growth and Vitality[3]. This goal includes workforce development and the use of stackable credentials to help workers become skilled and employable faster, while still being able to continue their education and job growth potential. The EET degree addresses both the workforce and industry needs, as well as incorporating a stackable certificate in Basic Electronics.

D. Quantifiable & reliable evidence and documentation of market supply & demand in the region and State:

1. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program.

There is an on-going shortage of trained workers in many middle skills jobs. An article in Forbes magazine recently highlighted the skills shortage and the effects an undertrained workforce has on America's ability to compete globally. The following is an excerpt from that article:

> The extent of the skills shortage becomes clearer when one looks at the information related to specific positions. For example, across the production sector overall, there would seem to be no shortage of workers, with 19 current workers for each opening. But in certain skilled production occupations, like *electrical engineering technicians, there are only six employed workers for each opening* [emphasis added]. That suggests a tight market for employers, despite an average wage of almost $60,000. If employers can't find the talent, those openings could move overseas—and take thousands of associated high-value engineering jobs with them. Companies that might once have moved overseas to access low wage labor will likely in the future do so to access skilled workers.[4]

In the manufacturing and industrial fields, electrical engineering technicians are a vital employee to ensure operations continue effectively and efficiently. In the fall of 2013, the Western Maryland Consortium, the Workforce Investment Board that serves HCC's service region, issued its "Workforce in Transition" report showing that Washington County is part of the shift from "old world" industrial jobs to "new world" industrial jobs. The Western Maryland Consortium has also observed this trend: "A high school diploma is no longer a sufficient credential to obtain employment that provides self-sufficiency ... The jobs of today require more formal technical preparation, computer skills/knowledge, problem solving skills, and more, especially in manufacturing."[5] New world facilities rely heavily on industrial electronics to operate automated equipment. Highly trained Electrical Engineering Technicians are needed to repair, maintain, troubleshoot, and improve the equipment and processes.

"In 2015, Maryland was ranked third in the nation in 'Innovation & Entrepreneurship' by the U.S. Department of Commerce in its annual Enterprising States report. Maryland ranked first for concentration of businesses and jobs in science, technology, engineering, and mathematics."[6] However, as referenced previously, employers encounter

challenges when hiring. Low educational attainment rates result in few workers with sufficient training. In Washington County, 19.9% of persons aged 25 or older have obtained Bachelor's degrees, compared to 37.3% in Maryland and 29.3% in the nation.[7] According to the Workforce Dashboard (Maryland Workforce Exchange Statistics), in August 2016, the great majority of job seekers in Washington County had only high school diplomas.[8] Nearly 48% of applicants seeking Electronics Engineering Technician jobs possess less than an Associate Degree while nearly 68% of the jobs listed require at least an Associate degree.[14]

The proposed A.A.S. in Electrical Engineering Technology addresses both the issues of educational attainment and the need for higher-level skills.

One of the major employers in Hagerstown is Volvo Powertrain, which manufactures engines and transmissions in a 1.5 million-square-foot facility. Manufacturing industries such as Volvo rely on automated equipment and sophisticated electronics that requires a high level of technical expertise to build, operate, troubleshoot, and repair the equipment. Unfortunately, many of these companies are struggling to find qualified, trained workers able to perform these functions.

Volvo and other companies are looking carefully at skills gaps and preparing for future workforce trends; Deloitte Development LLC and the Manufacturing Institute found that, among a group of CEOs surveyed, 74% said that workforce shortages in skilled production workers had had a significant negative impact on operations. Access to qualified talent was the most-often cited consideration in locating facilities.[9] Volvo noted, "The gaps related to robot programming, automation tooling and CNC machines [are] directly related to changing technology that [mechanics] are not educated on. In addition we know that we have a significant loss in uptime and productivity because of the lack of knowledge of our electricians related to new technology."[10]

2. Discuss and provide evidence of market surveys that clearly provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.

The descriptions of the following occupations all align in some ways with the goals of the AAS degree: Electrical and Electronics Repairers of Commercial and Industrial Equipment, and Electronics Engineering Technicians, Electro-Mechanical Technician, Electro-Mechanical Engineering Technician.

According to the U.S. Bureau of Labor Statistics, the Washington-Arlington-Alexandria-DC-VA-MD-WV metropolitan area was one of the United States' top ten largest employers of Electrical and Electronics Repairers of Commercial and Industrial Equipment. The annual mean wage for this occupation in our metropolitan area was $68,550.[11] In the category of Electronics Repairers, Commercial and Industrial Equipment, the Maryland Workforce Exchange indicates that "job opportunities should be excellent for qualified workers with an associate degree in electronics along with certification."[12] Maryland was a top five state with the highest mean annual wage for Electrical/Electronics Engineering Technicians with an annual mean wage of $69,440. The Washington-Arlington-Alexandria-DC-VA-MD-

WV metropolitan area was one of the United States' top ten largest employers of Electrical/Electronics Engineering Technicians with a mean annual wage of $71,800.[13]

Long Term (2014-2024)

Occupational Projections for Electrical Engineering Technology and Related Fields in Maryland[15]

State	Occupation Name	2014 Base	2024 Projected	Change	% Change	Average Annual Openings
MD	Electrical and Electronic Equipment Assemblers	3010	3220	210	6.8	60
MD	Electrical and Electronics Drafters	450	500	50	11.2	10
MD	Electrical and Electronics Engineering Technicians	3880	4300	420	10.8	120
MD	Electrical and Electronics Installers and Repairers, Transportation Equipment	190	200	10	5.8	10
MD	Electrical and Electronics Repairers, Commercial and Industrial Equipment	1320	1360	40	3.4	30
MD	Electromechanical Equipment Assemblers	560	560	0	0	10
MD	Electro-Mechanical Technicians	260	270	0	6.6	10
MD	Electronic Home Entertainment Equipment Installers and Repairers	420	450	30	8.2	20

Projected Annual Openings[16]

The table below shows the long term projected annual openings for Electrical and Electronic Engineering Technicians in Maryland from 2012 to 2022.

Occupation	Total Annual Average Openings	Annual Average Openings Due to Growth	Annual Average Openings Due to Replacement
Electrical and Electronic Engineering Technicians	91	13	78

3. Data showing the current and projected supply of prospective graduates.

HCC currently has 180 students in active majors that align somewhat with Electrical Engineering Technology. It is possible that as many as one-third of those students would chose to move to the Electrical Engineering Technology program in its initial year.

Students who are currently enrolled in the certificate program for Basic Electronics could easily transition into the Electrical Engineering Technology Degree program and have all of the credits apply towards the completion of the

EET degree program. Students who are currently enrolled in the Engineering degree program at HCC may find that the Electrical Engineering Technology degree program is more of what they are interested in.

E. Reasonableness of program duplication:

1. Identify similar programs in the State and/or same geographical area. Discuss similarities and differences between the proposed program and others in the same degree to be awarded.

Anne Arundel – A.A.S. Electronics Engineering Technology – focuses mainly on office electronics as specified in their program description. AACC's program does not incorporate the industrial electricity, automation equipment, and electronics used in manufacturing industries. Careers posted in their program description include computer service technician, electronics technician, field service technician, and instrumentation and control technician.

College of Southern Maryland – A.A.S. Engineering Technology with a concentration in Electronics – does not include electrical components of advanced circuit design and analysis, industrial electric motors, generators, and transformers, and similar advanced electrical skills needed in industrial settings.

Howard – A.A.S. Electronics Technology – focuses heavily on computers like PC and Mobile devices, as well as networks and telecommunications.

Wor-Wic – A.A.S. Electronics Engineering Technology – Similar to HCC proposal, but without electronic machines and advanced digital circuit design and analysis.

2. Provide justification for the proposed program.

The programs offered either differ significantly in scope, do not include industrial electronics, or are too far geographically for residents in Washington County to benefit. This program will be the only EET associate degree in western Maryland.

F. Relevance to Historically Black Institutions (HBIs)

1. Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBI's.

None of Maryland's historically black institutions offer a similar program.

2. Discuss the program's potential impact on the uniqueness and institutional identities and missions of HBIs.

There is no foreseeable impact on the uniqueness and institutional identities of Maryland's historically black institutions.

G. If proposing a distance education program, please provide evidence of the Principles of Good Practice (as outlined in COMAR 13B.02.03.22C).

N/A

H. Adequacy of faculty resources (as outlined in COMAR 13B.02.03.11).

Provide a brief narrative demonstrating the quality of program faculty. Include a summary list of faculty with appointment type, terminal degree title and field, academic title/rank, status (full-time, part-time, adjunct) and the course(s) each faulty member will teach.

Patricia Irwin – Instructor, Electrical Engineering Technology – Full-time

- Bachelors of Engineering in Electrical Engineering, Gannon University
- Professional Engineer's License - National Council of Examiners for Engineering and Surveying
- Masters of Business Administration, Frostburg State University

- Will teach ELE-101 Device Data Systems, ELE-103 Analog and Digital Electronics, ELE-110 Fundamentals of Electricity, , ELE-158 Circuits, Schematics, and Test Equipment, ELE-207 Advanced Electronics/Electricity, and ELE-208 Advanced Digital Circuit Design and Analysis

Edward Bass – Instructor – Advanced Manufacturing – Full-time

- Bachelors of Science in Engineering Science, Trinity University
- Masters of Science in Mechanical Engineering, University of Texas

- Will teach INT-104 Safety, ELE-113 Instrumentation and Process Control, ELE-204 Electrical Machines, and some elective courses (ELE-140 Robotics, ELE-203 PLC Applications, ADM-258 Motors)

Gregory Betz – Instructor – Alternative Energy and Industrial Technology – Full-time

- Bachelors of Science in Technology Education, Millersville University
- Masters of Science in Electronics and Computer Technology, Indiana State University

- Will teach INT-102 Introduction to PLCs and ELE-105 Microprocessors and Microcontrollers

I. Adequacy of library resources (as outlined in COMAR 13B.02.03.12).

Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program. If the program is to be implemented within existing institutional resources, include a supportive statement by the President for library resources to meet the program's needs.

The HCC William Brush Library offers access to full-text articles from a variety of journals available via several online subscription article databases and the Directory of Open Access Journals. The library also subscribes to Films On Demand, a streaming video collection which contains more than 300 films related to building and technical trades or engineering technology.

The library provides access to journals in print and electronic formats that can be located by searching the online library catalog. All together, the library's paper and e-book collections contain several thousand items. As well as the books, films, and online databases mentioned above, all students and faculty have access to the library's interlibrary loan services through which they can request copies of articles and temporary loans of books from other libraries.

Students may log in to use any of the library's electronic resources (databases, e-books, and Films On Demand) from anywhere at any time.

J. Adequacy of physical facilities, infrastructure and instructional equipment (as outlined in COMAR 13B.02.03.13)

Provide an assurance that physical facilities, infrastructure and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and faculty offices, and laboratories for studies in the technologies and sciences. If the program is to be implemented within existing institutional resources, include a supportive statement by the President for adequate equipment and facilities to meet the program's needs.

In 2015, HCC was approved for Perkins equipment purchases totaling $164,000 for Advanced Manufacturing and Electronics equipment. In addition, HCC received funds from Washington County and the state for the renovation of the second floor of the College's Advanced Technology Building. Additional funding for electronics equipment was secured through the Appalachian Regional commission and a National Science Foundation grant for Advanced Manufacturing. These renovations are already underway and nearly complete. The new EET degree will be able to utilize the new equipment, as well as the classroom and lab spaces. Therefore, the EET degree will not require additional resources to start-up, operate, or maintain.

Included in the funded 2015-2016 project was the transformation of existing classrooms and faculty offices into two classrooms, an electronics lab, an advanced manufacturing lab, a large storage area for electronics equipment, and three faculty offices. The goals of the renovation were: 1) to foster collaboration between students and faculty by bringing classrooms, laboratories, and offices together in close proximity; 2) to provide a safe space for students to use electrical and robotics equipment, including electrical labs furnished with wooden counters, access to electrical outlets without the use of extension cords, and appropriate floor space for rolling large custom-made trainer carts; and 3) to demonstrate to local manufacturers that HCC is creating a sustainable program with equipment and spaces that reflect the high standards set by industry.

K. Adequacy of financial resources with documentation (as outlined in COMAR 13B.02.03.14)

1. Complete Table 1: Resources (pdf) and Table 2: Expenditure (pdf). Finance data (pdf) for the first five years of program implementation are to be entered. Figures should be presented for five years and then totaled by category for each year.

TABLE 1: RESOURCES					
Resource Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Reallocated Funds	0	0	0	0	0
2. Tuition/Fee Revenue	47040	90210	114470	134460	158850
(c+g below)					
a. Number of F/T students	10	20	25	30	35
b. Annual Tuition/Fee Rate	3930	3930	3950	3950	3960
c. Total F/T Revenue (a x b)	39300	78600	98750	118500	138600
d. Number of P/T Students	10	15	20	20	25
e. Credit Hour Rate (# of credits earned)	6	6	6	6	6
f. Annual Credit Hour Rate	129	129	131	133	135
Total P/T Revenue (d x e x f)	7740	11610	15720	15960	20250
3. Grants, Contracts & Other External Sources	0	0	0	0	0
4. Other Sources	0	0	0	0	0
TOTAL (Add 1-4)	47040	90210	114470	134460	158850
TABLE 2: EXPENDITURES					
Expenditure Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Faculty (b+c below_)	54743	55666	56657	57617	58647
a. # FTE	1	1	1	1	1
b. Total Salary	46143	47066	48007	48967	49947
c. Total Benefits	8600	8600	8650	8650	8700
2. Admin. Staff (b + c below)					
a. # FTE	0	0	0	0	0
b. Total Salary					
c. Total Benefits					
3. Support Staff (b + c below)					
a. # FTE	0	0	0	0	0
b. Total Salary					
c. Total Benefits					
4. Equipment	0	0	0	0	0
5. Library	0	0	0	0	0
6. New or Renovated Space	0	0	0	0	0
7. Other Expenses	0	0	0	0	0
TOTAL (Add 1-7)	54743	55666	56657	57617	58647

2. Provide a narrative rational for each of the resource category. If resources have been or will be reallocated to support the proposed program, briefly discuss the sources of those funds.

- **Tuition and Fee Revenue**

These enrollment projections align with other recent career and technical degree programs at HCC, and with a 45% graduation rate across campus, will produce the desired number of roughly 15 graduates per year.

- **Grants, Contracts, & Other External Sources**

HCC will not require any additional funding from grants, contracts, or other external sources to start the EET degree. HCC is completing a renovation of the Advanced Technology Building and purchase of equipment, which was funded by a previous Perkins allocations, an NSF Advanced Manufacturing grant, an Appalachian Regional Commission grant, Washington County funding, and state funding. The project was completed for the Advanced Manufacturing degree and the Basic Electronics Certificate; however, the EET program will be able to use the same equipment and renovated space without additional purchases or renovations.

Since the EET degree will be a career program, it will be List A Perkins eligible. Although relatively little equipment is required to start the program, Perkins funding could purchase new equipment that may become necessary to stay current in the field, as well as professional development for instructors.

- **New and/or Renovated Space:**

The second floor of the Advanced Technology Building is currently being renovated and will be available for use for the fall 2016 semester. The renovations include an Electronics lab equipped with FESCO industrial electronic trainers, Siemens programmable logic controllers, oscilloscopes, as well as other electronics equipment.

L. Adequacy of provisions for evaluation of program (as outlined in COMAR 13B.02.03.15).

Discuss procedures for evaluating courses, faculty and student learning outcomes.

HCC assesses programs using several methodologies including Student Learning Outcomes Assessment, faculty evaluation, and through an annual unit planning process.

Student Learning Outcomes Assessment

Student Learning Outcomes Assessment (SLOA) is a deliberate, systematic, and collaborative process driven by the College's commitment to improve student learning. It is a purposeful course of action that defines student accomplishments in terms of expected learning outcomes and core competencies. Actual student achievement is measured using established internal standards and external benchmarks. The outcomes assessment process is learning-centered and accumulates data from numerous sources to determine what students know, what skills they possess, how they conceptualize, and how they will continue to learn. The overall goal of assessment is to create a quality learning environment under ideal conditions through the use of best practices that inspire creativity, innovation, and critical thinking.

Student Learning Outcomes Assessment is an ongoing component of the instructional process. All members of the institution share responsibility for student learning. Continuous improvement of learning is a collaborative enterprise upon which the success of instruction depends. The results of SLOA are never used in a punitive manner toward students, faculty, or staff. The data collected during the assessment process is used to provide feedback to students and faculty, reinforcing and improving educational practices that facilitate learning.

The Electrical Engineering Technician program will be evaluated at the course and program level on an annual basis. Resource allocation (including equipment, staff, and faculty) is driven by needs addressed in the SLOA process.

Faculty evaluation

Faculty are evaluated annually by the Division Chair or Director responsible for their supervision. The purpose of this evaluation is to provide the faculty member with information from a supervisory perspective, synthesize information from various components of the evaluation process, and assist in the development and implementation of the Annual Faculty Review and Professional Development Plan. This evaluation will include: a written report based on a classroom observation, annually for non-tenured faculty, and every three years for tenured faculty; a listing of the prior two semesters' of student evaluations of teaching; and the supervisor's assessment of the faculty member's performance in meeting the full range of faculty duties, including professional development, as well as an assessment of college and community service.

Faculty also undergo evaluation in every course taught via student evaluations. The recommended level of minimum acceptable performance on the evaluation instrument is 75%. Faculty members receiving less than acceptable student evaluations will be counseled and given advice by his/her Division Chairs/Directors to improve his/her evaluation scores.

Unit Planning

Each year the College engages in an integrated process of planning, evaluation, and budgeting for the following fiscal year. Every unit of the college prepares a plan that reflects its accomplishments (Annual Productivity Report), and, building on the College's mission, vision, institutional priorities, and strategic plan, submits its projected needs (Unit Plan). This planning process identifies challenges and opportunities for each program in the areas of curriculum, recruiting, staffing, and budget. The plan for each unit includes:

- The unit's goals to maintain and improve productivity (e.g. new personnel, supplies, equipment, or facilities);
- Timelines;
- Persons responsible; and
- Assistance that may be required outside the department.

M. Consistency with the State's minority student achievement goals (as outlined in COMAR 13B.02.03.05 and in the State Plan for Postsecondary Education).

Discuss how the proposed program addresses minority student access & success, and the institution's cultural diversity goals and initiatives.

In 2009 HCC created and implemented the Cultural Diversity Plan, which guides changes in campus policies and procedures with the values of equal access and equal treatment for all as the foundation. This Plan represents HCC's commitment to provide an atmosphere of cultural diversity, equal opportunities for employment and access to education and training. Progress toward achieving the goals herein will strengthen the college as a whole.

In addition, HCC's 2016 Strategic Plan (and previous Plans) outlines goals and action plans for a diverse student body and workforce. 2016 addresses the importance of diversity by establishing specific goals, sub-goals and action plans, which the College adopted as relevant goals for its Cultural Diversity Plan. HCC annually updates its strategic plan, revising and adding sub-goals and action plans as institutional priorities change or are added. It can be accessed on the HCC website at: http://www.hagerstowncc.edu/sites/default/files/documents/140622-cultural-diversityplan.pdf.

Between 2006 and 2013, the percentage of minority students on campus increased from 12% to 24%. The population of Black students grew by 103% during that period, while the Hispanic student population grew by 187%. The College will promote and recruit minorities in Electrical Engineering Technology. Gains in diversity will be made as College recruiters target regional areas with significant minority populations, along with emphasizing that the cost of an HCC education for out-of-state students is lower than the cost of their state universities.

N. Relationship to low productivity programs identified by the Commission:

If the proposed program is directly related to an identified low productivity program, discuss how the fiscal resources (including faculty, administration, library resources and general operating expenses) may be redistributed to this program.

No low-productivity programs are related to this proposed program.

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[1]2013 Maryland State Plan for Postsecondary Education, MHEC, page 9
[2]2013 Maryland State Plan for Postsecondary Education, MHEC, page 17
[3]2013 Maryland State Plan for Postsecondary Education, MHEC, page 37
[4]"The real jobs tragedy in the US: We've lost the skills", Joe Fuller, Forbes Magazine, February 24, 2016. http://www.forbes.com/sites/gradsoflife/2016/02/24/the-real-jobs-tragedy-in-the-us-weve-lost-the-skills/#1c1eafa17baa
[5]Western Maryland Consortium, "A Workforce in Transition," report to Washington County EDC, October 2013
[6]Maryland at a glance. Maryland.gov. http://msa.maryland.gov/msa/mdmanual/01glance/economy/html/economy.html
[7]http://www.census.gov/quickfacts/table/EDU685214/24,24043,00
[8]http://www.dllr.state.md.us/workforcedashboard/
[9]Deloitte and Manufacturing Institute, "Boiling point? The skills gap in U.S. manufacturing." 2011.

http://www.themanufacturinginstitute.org/~/media/A07730B2A798437D98501E798C2E13AA/2011_Skills_Gap_Report.pdf

[10]Chart and language presented in e-mail communication from Volvo, October 6, 2014

[11]Occupational Employment and Wages, May 2015 for Electrical and Electronics Repairers, Commercial and Industrial Equipment. US Bureau of Labor Statistics, http://www.bls.gov/oes/current/oes492094.htm#ind

[12]Occupation Summary for Electronics Engineering Technicians, Maryland Workforce Exchange, March 3, 2015.

[13]Occupational Employment and Wages, May 2015 for Electrical and Electronics Engineering Technicians. US Bureau of Labor Statistics, http://www.bls.gov/oes/current/oes173023.htm#st

[14]Occupation Summary for Electronics Engineering Technicians, Maryland Workforce Exchange, March 3, 2015.

[15]http://www.projectionscentral.com/Projections/LongTerm

[16]Occupation Profile for Electrical Engineering Technicians, Maryland Workforce Exchange, August 9, 2016.