MARYLAND HIGHER EDUCATION COMMMISSION
ACADEMIC PROGRAM PROPOSAL

PROPOSAL FOR:

____ NEW INSTRUCTIONAL PROGRAM
X 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

Fall 2017
Projected Implementation Date

Associate of Science
Award to be Offered

Engineering Science
Title of Proposed Program

4940.01
Suggested HEGIS Code

14.0101
Suggested CIP Code

Mathematics and Science
Department of Proposed Program

Laurie Montgomery
Name of Department Head

Carol Rothstein
Contact Name

carothstein@hagerstowncc.edu
Contact E-Mail Address

240-500-2437
Contact Phone Number

Signature and Date
President/Chief Executive Approval

3/21/2017
Date
Date Endorsed/Approved by Governing Board

HAGERSTOWN COMMUNITY COLLEGE

11400 Robinwood Drive • Hagerstown, Maryland 21742-6514 • 240-500-2000

Office of the Vice President of Academic Affairs and Student Services

James D. Fielder, Ph.D.
Secretary of Higher Education
The Maryland Higher Education Commission
6 N. Liberty St.
Baltimore, MD 21201

March 7, 2017

Dear Dr. Fielder,

I am pleased to submit for approval a substantial modification and title change to the current Associate of Science in Pre-Engineering (changed to AS in Engineering Science) at Hagerstown Community College. The Board of Trustees is aware of our curricular work and will formally approve the new program at its next meeting on March 21, 2017.

Thank you for your consideration of this proposed change. If I can provide additional information, please contact me.

Sincerely,

C. David Warner, Ed.D.
Vice President of Academic Affairs and Student Services

Action

Board of Trustees
Hagerstown Community College
11400 Robinwood Drive
Hagerstown, Maryland 21742-6590

Subject: Substantial Modification to A.S. Pre-Engineering Date: March 21, 2017

Background/Rationale:

The changes to the Associate of Science in Pre-Engineering aligns the curriculum with the requirements for the first two years of a Bachelor's degree in Engineering. This change, along with a title change to Engineering Science, facilities transfer and supports student success in future engineering studies. The degree includes three pathways: Electrical/Computer, Mechanical/Aerospace/Civil, and Chemical/Environmental. The degree will be 64 credits, which is under the state maximum of 65 credits for Engineering transfer degrees.

RECOMMENDATION:

To approve the substantial modification to the Associate of Science in Pre-Engineering (change to A.S. in Engineering Science).

Prepared by: C. David Warner

Title: Vice President of Academic Affairs and Student Services

Recommend by: Guy Altieri, President

Related College Policies: N/A

Substantial Modification for Associate of Science in Pre-Engineering

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.

This substantial modification to Hagerstown Community College's (HCC) current Pre-Engineering degree involves changing the title of the degree to Engineering Science, as well as changes to the core curriculum. The Associate of Science in Engineering Science will be a 64 credit degree program that focuses on maximizing courses for transfer to engineering programs offered at Maryland universities.

A main tenant of HCC's mission is to enable university transfer. Students attend Hagerstown Community College for many reasons: unsure of academic plan; economics of a four-year institution are not viable; delayed or re-entering academics; participation in HCC's STEM Middle College; or a variety of other reasons. HCC has and will continue to offer our students a broad-spectrum of degrees and programs that satisfy the student's particular needs with excellent instruction at a modest cost. The Associate of Science in Engineering Science improves the current engineering program at HCC by further enhancing the student's transferability to Maryland's four-year institution's engineering programs by 1) offering engineering pathways and 2) by focusing on technical curricula similar to the first and second year engineering programs at four-year institutions.

The changes to the Engineering degree feature three pathways that support transfer into the variety of engineering degrees available at Maryland's universities: A) Electrical; B) Mechanical and C) Chemical. The Electrical Pathway will enable HCC students to take second-year courses specifically situated towards Electrical, Electronic and Computer Engineering programs. The Mechanical Pathway will enable HCC students to take second-year courses specifically situated towards Mechanical, Aerospace, Materials Science, and Civil Engineering programs. The Chemical Pathway will enable HCC students to take second-year courses specifically situated towards Chemical, Biological, and Environmental Engineering programs. The pathways are guidelines;

program requirements will take precedence and students will be free to tailor their engineering coursework to match their particular chosen engineering program at a variety of Maryland and out-of-state institutions.

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

The changes to the Engineering degree directly support HCC's Strategic Plan Strategic Goal 2, 'Maintain a Responsive, Dynamic Curriculum and Teaching Excellence' and Strategic Goal 3, 'Strengthen Enrollment Management Systems and Improve Student Retention and Program Completion'. Specifically, sub-goal 2.4 focuses on the need for program laddering to support technical fields while sub-goals 3.1b and 3.1f address increases in completion rates and student course loads to support degree completion. The changes increase student participation in courses and are directly attributed to students' selected engineering field of study, which will provide three improvements: 1) increase students' engagement in their selected engineering field; 2) allow students to transfer to four-year institutions with additional core courses completed; and, 3) require less total time in attaining a four-year engineering degree. These three improvements indicate that the change from the Associate Degree in Pre-Engineering to Associate Degree in Engineering Science directly supports HCC's Strategic Plan.

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.

The Associate of Science in Engineering Science requires 32 General Education credits, 25-28 program credits in engineering courses, and 4-7 restricted elective credits for a total of 64 credits. The following courses are program requirements and are required for all students seeking the Associate of Science in Engineering Science:

Course #	Title	Credits
EGR 103	Introduction to Engineering Science	3
CHM 103	General Chemistry I	4
CHM 104	General Chemistry II	4
MAT 204	Calculus II	4
MAT 206	Differential Equations	4
	Electrical/Computer Engineering Pathway	
EGR 208 and	Systems and Circuits	4
EGR 210	Digital Logic Design	4
	OR	
	Mechanical/Aerospace/Civil Engineering Pathway	
EGR 108 and	Statics	3
EGR 203 and	Mechanics of Materials	3
EGR 204	Dynamics	3
	OR	
	Chemical/Environmental Engineering Pathway	
EGR 108 and	Statics	3
EGR 206	Thermodynamics	3
	TOTAL	25-28

Course Descriptions for Program Courses:

EGR 103 Introduction to Engineering Science 3 Credits

This course will introduce students to the product development process, which includes: product research, product design, product analysis and evaluation, and product presentation. Additionally, each individual student should develop basic engineering and science principles as well as computer skills including; applications software, graphics software and programming software.

CHM 103 General Chemistry I 4 Credits

This course is the first semester of a two-semester sequence for science majors and pre-professional students with strong backgrounds in chemistry and math. It presumes a working knowledge of dimensional analysis, chemical formulas and nomenclature, stoichiometry, gas laws and solutions.

CHM 104 General Chemistry II **4 Credits**

This is a continuation of CHM 103. The course includes solutions, kinetics, equilibrium, thermodynamics, electrochemistry, and nuclear chemistry.

MAT 204 Calculus II **4 Credits**

This course is a continuation of Calculus I. Topics include: techniques and applications of integration, infinite sequences and series, convergence tests, series representation of functions, and parametric equations.

MAT 206 Differential Equations **4 Credits**

This course includes classification of differential equations, solutions of equations of order one and higher order, solutions of linear equations, differential operators, systems of equations, solution of certain non-linear equations, solution in series, Laplace transforms, partial differential equations with variables separable, and an existence and uniqueness theorem are among the topics covered in this course.

EGR 108 Statics **3 Credits**

A vector-based treatment of statics is presented, including coverage of force systems, moments, couples, centroids, area moments of inertia, friction, and use of free-body diagrams in the solution of equilibrium problems of trusses, frames, and machines.

EGR 203 Mechanics of Materials **3 Credits**

This course studies the deformation of engineering materials in relation to stress and temperature. It includes axial, biaxial, torsional, shearing, combined and statically indeterminate loadings of beams, columns, shafts, tanks and connections, as well as deflection, and an introduction to plastic analysis.

EGR 204 Dynamics **3 Credits**

Coverage of principles of dynamics, kinematics, and kinetics of particles, kinetics of systems of particles, and kinematics and kinetics of rigid bodies through Euler's equations is included.

EGR 208 Systems and Circuits **4 Credits**

This course includes basic circuit theory including Kirchoff's Laws, node and mesh analysis in the time and frequency domains and solution of circuit differential equations. Also treated are linear, non-linear and time-varying elements of systems and circuits, zero input, zero state and complete response, coupled elements, ideal transformers, controlled sources and basic filters.

EGR 206 Thermodynamics 3 Credits

This course covers heat, work, and related properties of substances as well as equations of state, internal energy, enthalpy, entropy, and application of the first and second laws of thermodynamics.

EGR 210 Digital Logic Design 4 Credits

This course includes the design of logic gates, flip-flops, registers, counters and the analysis of digital logic networks. Also included are Karnaugh map simplification and switching algebra, synchronous sequential systems, Programmable Logic Arrays, multiplexors and encoder/decoders, binary arithmetic with adders and subtractors, decimal to octal, hexadecimal and binary conversion.

The following are restricted electives that can be taken to complete the Associate of Science in Engineering Science:

Course #	Title	Credits
EGR 203	Mechanics of Materials	3
EGR 208	Systems and Circuits	4
EGR 204	Dynamics	3
EGR 206	Thermodynamics	3
EGR 210	Digital Logic Design	4
EGR 211	Elements of Discrete Signal Analysis	4
MAT 209	Engineering Programming Using MATLAB	3
CHM 203	Organic Chemistry I	4
CHM 204	Organic Chemistry II	4
PHY 205	Principles of Physics III	1
MAT 161	Pre-calculus	4
	Any Biology Lab Course	
	Any Computer Science Course	
	Any Information Science Course	

Course Descriptions for Restricted Elective Courses:

EGR 211 Elements of Discrete Signal Analysis 4 Credits

This course introduces basic tools for the analysis of continuous and discrete time signals, including linear transformations and linear systems, solutions to linear simultaneous systems via Gaussian elimination, Fourier Transforms (continuous and discrete), finite impulse response filters and the z transform. The course also includes design projects emphasizing MATLAB applications to signal and image processing.

MAT 209 Engineering Programming Using MATLAB 3 Credits

This course is designed to give students exposure to the commonly-used scientific computing language MATLAB®. Students learn to do numerical and symbolic operations, solve equations, display graphics and write programs to solve problems.

CHM 203 Organic Chemistry I 4 Credits

This course is the first semester of a two-semester organic chemistry sequence with laboratory. It is required for science/engineering majors and pre-professional students. The course includes alkanes, alkenes, alkynes, and alkyl halides, with an emphasis on their nomenclature, preparations, reactions, kinetics, and stereochemistry. Reaction mechanisms are emphasized. An introduction to spectroscopy and chromatography is included.

CHM 204 Organic Chemistry II 4 Credits

This course is a continuation of CHM 203. The course includes aromatic compounds, alcohols, aldehydes, ketones, carboxylic acids and derivatives, amines, biomolecules which include lipids, proteins, and carbohydrates.

MAT 161 Pre-Calculus 4 Credits

This course is a one-semester preparation for calculus which is acceptable as a general education course. The concept of a function underlies and unifies the treatment of polynomial and rational functions, exponential and logarithmic functions, trigonometric functions, and coordinate geometry.

PHY 205 Principles of Physics III 1 Credit

This is a supplementary course to PHY 204 offered tutorially as needed and concurrently with PHY 204. Topics include nuclear physics and relativity.

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

AS, Engineering Science - Student Learning Outcomes	
Student Learning Outcomes	**Justification**
An ability to apply knowledge of mathematics, science, and engineering.	Mathematics, science and engineering knowledge is fundamental to successful completion of course work and engineering career requirements. The learning objectives for each engineering course and the selection of required courses satisfies this outcome.
An ability to design and conduct experiments, as well as to analyze and interpret data.	The conduct of experiments as part of the Design Process and Engineering Method are essential to continue engineering coursework and for practicing engineers. Coursework combined with design projects or laboratory work is included as part of the planned Associate of Science, Engineering coursework.
An ability to design a system, component, or process to meet desired needs within specified constraints.	The Design Process (design under constraint) is fundamental to engineering upper level coursework/Capstone projects and for practicing engineers. Selected engineering courses include design projects to introduce students to this important skill that will be needed for continued coursework and as a practicing engineer.
An ability to function on multidisciplinary teams and an ability to communicate effectively.	Engineering projects are nearly always multi-disciplinary: different engineering disciplines are needed to arrive at a final design. Selected HCC engineering courses include team design projects to introduce and emphasize design team concepts and dynamics to engineering students – skills which will be needed for upper-level courses, Capstone design projects and as practicing engineers.
An ability to identify, formulate, and solve engineering problems.	The Engineering Method is fundamental to an engineering education. All engineering courses at HCC emphasize the engineering method for identifying, formulating, solving and verifying solutions to problems. Mastery of these skills will be essential to completing the Associates of Science, Engineering at HCC, Bachelors/Masters/Doctoral degrees at universities and as practicing engineers.
An ability to use the techniques, skills, and modern engineering tools necessary for successful practice.	Knowledge and use of techniques and skills afforded by advances in engineering tools is a necessary skill for HCC students to master as part of their curriculum at HCC, at their four-year universities and as practicing engineers. Many employers expect that the new engineers that they hire have been exposed to and have some proficiency with engineering techniques and tools. For instance, engineers will need proficiency with CAD packages, mathematics toolboxes and modeling/simulation software. HCC incorporates these tools and techniques into engineering courses (CREO, MATLAB, PSpice).

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

Students will take 32 credits of General Education, including:

Math General Education (MAT 203 - Calculus 1)	4 credits
English General Education (ENG 101 - English Composition)	3 credits
Arts & Humanities General Education	6 credits
Diversity General Education	3 credits
Biological & Physical Science General Education (PHY 203 & 204)	10 credits
Behavioral/Social Science General Education	6 credits

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

No special accreditation is required for this proposed degree. HCC has been accredited by Middle States.

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 has offered a program in Pre-Engineering, which was previously Engineering Transfer, for many years to support students desiring to transfer to four-year institution to complete Bachelors of Science in an engineering field of study. The revised HCC Associate of Science in Engineering Science is designed to closely match the first two years of a four-year institution's engineering degree. The addition of programmed 'pathways' for students will better allow HCC's engineering students to match up HCC's curriculum with four-year institution curriculum in their desired field.

HCC is geographically situated such that there are no competing institutions that support an engineering degree. HCC provides students with the ability to pursue the first two years of an

engineering degree while minimizing educational costs, and allowing students to preserve educational costs and, in some instances, potentially maintain full time work.

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

The 2013-2017 Maryland State Plan for Post-Secondary Education identifies the need for increasing Engineering based degrees within Maryland[1]. The State Plan also calls out the need for engineering based Associate of Science degrees, specifically programs designed for articulation with other Maryland institutions[1]. HCC offers a path towards completion of engineering degrees for both traditional and non-traditional students. The revised Associate of Science in Engineering Science allows students to better tailor their curriculum at HCC to better integrate to Maryland's four-year institutions. Further, HCC has articulation agreements in place with universities in Maryland and adjoining states. Finally, HCC's engineering and general education courses are all listed within ARTSYS, ensuring transfer of courses within Maryland.

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.

The 2013-2017 Maryland State Plan for Post-Secondary Education highlights the need for STEM graduates, especially in Engineering to maintain Maryland's competitive climate for business and technology[2]. HCC's program does not directly supply graduates to the workforce but does enable traditional and non-traditional students to complete the first two years of their engineering degrees. Engineering degrees are always in demand and HCC will enable additional students to gain their engineering degrees that might not otherwise have embarked on such a path.

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 United States Department of Labor projects employment outlooks for a wide variety of engineering fields for 2014-2024[3]. All of the following can enter the workforce with Bachelor's degrees (job growth reflects national trends):

- Civil Engineers have an 8% job growth outlook nationally with a median annual wage of $82,220.
- Mechanical Engineers have a job growth outlook of 5% with an average median annual salary of $83,590.
- Environmental Engineers have a 12% job growth outlook a median salary of $84,560
- Chemical Engineers have a 2% job growth outlook with a median salary of $97,360.

Retrieved from: https://www.bls.gov/ooh/architecture-and-engineering/

In Maryland, the following occupational trends are predicted for 2014-2024[4] (all showing job growth):

Job Title	Percent Growth	# Jobs in 2014	Number Jobs predicted 2024
Aerospace Engineers	15.75%	2,921	3,381
Agricultural Engineers	21.88%	32	39
Biomedical Engineers	26.5%	668	845
Chemical Engineers	10.24%	723	797
Civil Engineers	23.13%	6,635	8,170
Electrical Engineers	13.02%	4,408	4,982
Engineering Teachers	29.48%	1,706	2,209
Environmental Engineers	23.26%	1,165	1,436
Industrial Engineers	10.97%	2,635	2,924
Materials Engineers	8.5%	740	803
Mechanical Engineers	14.71%	5,066	5,811

Retrieved from https://www.dllr.state.md.us/lmi/iandoproj/maryland.shtml

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

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.

HCC's curriculum offering in Engineering Science is also partially offered by Frederick Community College in the local driving area. Students that attend HCC often are drawn from Washington County, MD and surrounding counties in West Virginia and Pennsylvania. This application modifies HCC's Pre-Engineering degree program to allow students to better tailor curriculum to their respective engineering disciplines at four-year institutions.

2. Provide justification for the proposed program.

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.

There is no foreseeable impact on the implementation or maintenance of high-degree programs at any of Maryland's Historically Black Institutions.

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.

C. Edward Sigler – Assistant Professor, Engineering, Full-time

- BS, Electrical Engineering, Virginia Polytechnic Institute and State University
- MS, Electrical Engineering, Communications, George Washington University
    - All Engineering (EGR) courses except EGR 206 Thermodynamics

Veronica Stein – Professor, Chemistry, Full-time

- BS, Chemistry, Bradley University
- PhD, Physical Chemistry, University of Wisconsin, Madison
    - CHM 103 General Chemistry I, CHM 104 General Chemistry II, and EGR 206 Thermodynamics

Christopher Lewis – Associate Professor, Mathematics, Full-time

- BS, MA Mathematics, George Washington University
- MAT, Mathematics, University of Idaho
    - MAT 204 Calculus II

Jennifer Szczesniak – Assistant Professor, Mathematics, Full-time

- BA, Mathematics and French, Kings College
- MS, Mathematics, Lehigh University
    - MAT 206 Differential Equations

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 Brish 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.

The Engineering program will continue to be housed in the STEM building, which includes the use of the following labs and lecture rooms:

- STEM 101 & 102/103 – Computer Labs (MATLAB and CREO - CAD software required by the program already installed and updated/renewed on an annual basis). STEM 101 seats 40 students. STEM 102 /103 can accommodate 20 students each, and are adjoined by a connecting door for larger classes.
- STEM 201 & 203 (Physical Science and Engineering/Physics Lab) each can accommodate up to 24 students. STEM 313 (Digital Instrumentation lab shared with TCS Division) can seat 16 students due to the room size and equipment in the room. These rooms contain a variety of equipment shared between General Physical Science/Physics, Engineering and Advanced Manufacturing/Engineering Technology in the Technology & Computer Studies Division (TCS). This equipment includes (but is not limited to):
    - LabVolt electronic circuit demonstrators and analysis equipment; Multimeters; Waveform Generators; Digital Logic demonstrators, Oscilloscopes, Pasco truss bridge demonstration kits, OrCad CAD software,P-SPICE circuit simulation, and a Tension Tester

- The following lecture rooms are available in the STEM building for lectures. All lecture spaces seat over 24 students. Specifically, the following rooms can accommodate the following number of students:
    - STEM 301, 305, 405, 409 – 36 students
    - STEM 308 & 506 – 40 students
    - STEM 407 – 48 Students
    - LSC (Learning Support Center) lecture hall is used by the Mathematics and Science Division and can accommodate lectures of up to 60 students
- All lecture and laboratory rooms include technology for instructor presentations including, but not limited to, computer station with internet, Extron audio visual system, LCD projector, Document Camera, touch panel controls, and podium. In some cases, Blu-Ray players and lab specific equipment are also installed.

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 (c+g below)	148260	170940	190980	193860	218815
a. Number of F/T students	20	25	30	30	35
b. Annual Tuition/Fee Rate	3930	4008	4008	4068	4169
c. Total F/T Revenue (a x b)	78600	100200	120240	122040	145915
d. Number of P/T Students	90	90	90	90	90
e. Credit Hour Rate (# of credits earned)	6	6	6	6	6
f. Annual Credit Hour Rate	129	131	131	133	135
g. Total P/T Revenue (d x e x f)	69660	70740	70740	71820	72900
3. Grants, Contracts & Other External Sources	0	0	0	0	0
4. Other Sources	0	0	0	0	0
TOTAL (Add 1-4)	148260	170940	190980	193860	218815

TABLE 2: EXPENDITURES					
Expenditure Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Faculty (b+c below_)	106200	108324	110490	112699	114953
a. # FTE	1.5	1.5	1.5	1.5	1.5
b. Total Salary	90000	91800	93636	95508	97418
c. Total Benefits	16200	16524	16854	17191	17535
2. Admin. Staff (b + c below)	0	0	0	0	0
a. # FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
3. Support Staff (b + c below)	0	0	0	0	0
a. # FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
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)	106200	108324	110490	112699	114953

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.

This program already exists at HCC, therefore, no new resources are necessary for the continuation of the program. C. Edward Sigler currently teaches the Engineering courses, and the other three faculty members are full-time faculty who are mainly supported through their disciplines of Chemistry and Mathematics. The FTE for salary and benefits reflect one FTE for Sigler and .5 FTE for the combined time and effort of Stein, Lewis, and Szczesniak. The projected enrollment numbers are based on the actual number of enrolled students in the existing Pre-Engineering degree.

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 Engineering Science 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 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 Director 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. 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. The 2016 Strategic Plan 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. HCC's Cultural Diversity Plan 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%. 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 program modification.

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[1]2013-2017 Maryland State Plan for Postsecondary Education, MHEC, page 21, 54-54
[2]2013-2017 Maryland State Plan for Postsecondary Education, MHEC, page 12
[3]Occupational Outlook Handbook. Architecture and Engineering Occupations. United Stated Department of Labor. Retrieved from https://www.bls.gov/ooh/architecture-and-engineering/
[4]Maryland Occupational Projections 2014-2024: Workforce Information and Performance. Department of Labor, Licensing, and Regulation. Retrieved from https://www.dllr.state.md.us/lmi/iandoproj/maryland.shtml