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

Cecil College
Institution Submitting Proposal

Spring 2016
Projected Implementation Date

Associate of Science
Award to be Offered

Engineering with Areas of Concentration in Aerospace Engineering, Chemical Engineering, Computer Engineering, and Engineering Science
Title of Proposed Program

4940.01	**14.0101**
Suggested HEGIS Code	Suggested CIP Code

Sciences	**Veronica Dougherty, Ph.D.**
Department of Proposed Program	Name of Department Head

Rebecca Walker	**rwalker@cecil.edu**	**443-674-1948**
Contact Name	Contact E-Mail Address	Contact Phone Number

Mary Way Bolt   *3/10/16*_____ President/Chief Executive Approval
Signature and Date

June 25, 2015_____Date Endorsed/Approved by Governing Board

A. Centrality to institutional mission statement and planning priorities:

The Associate of Science degree in Engineering is designed for students to earn the first two years of an engineering degree and transfer to a four-year engineering program. This supports the College's mission which includes "transfer programs to meet the economic development of the country and surrounding region." The program provides the necessary general education and foundation courses in math, physics, and chemistry, as well as some basic engineering courses. The areas of concentration in aerospace, chemical, computer, and engineering science (consisting of 18-20 credits) permit students to further refine their studies.

Founded in 1968, Cecil College is an open-admission, learner-centered institution located in a rural community in Maryland's most northeastern county. The College's mission includes career, transfer, and continuing education coursework and programs that anticipate and meet the dynamic intellectual, cultural, and economic development challenges of Cecil County and the surrounding region. Through its programs and support services, the College strives to provide comprehensive programs of study to prepare individuals for enriched and productive participation in society. The College enrolls approximately 8,500 students in credit and non-credit programs.

Cecil College has offered the proposed program and concentrations as "options" under the Arts and Sciences Transfer degree for many years. The Associate of Science degree is a more appropriate designation, and is more consistent with other approved programs in the state.

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

The Associate of Science Engineering Program offers a selection of engineering, and other natural and physical science courses for students wishing to pursue a program of study in engineering with concentrations in aerospace, chemical, computer, and engineering science. The curriculum is designed to meet the needs of students who plan to transfer to a college or a university that grants a baccalaureate degree in engineering.

Student Learning Outcomes:

Upon successful completion of the AS Engineering Program, students will:

- Apply knowledge of mathematics, science, and engineering
- Design and conduct experiments
- Conduct tests for chemical components or strength of materials
- Determine forces acting on a body
- Analyze and interpret data
- Apply the engineering design process
- Function on multidisciplinary teams
- Identify the professional and ethical responsibilities of engineers
- Identify, formulate, and solve engineering problems

- Use the techniques, skills, and modern engineering tools necessary for engineering practice
- Communicate in an effective and professional manner both verbally and in writing

Additional Outcomes – Area of Concentration in Aerospace Engineering

Upon successful completion of this concentration, students will also be able to:

- Demonstrate an understanding of kinematics of a particle and a rigid body
- Demonstrate an understanding of kinetics concerning force and acceleration, work and energy, impulse and momentum for a particle and a rigid body
- Demonstrate an understanding and application of force vectors
- Demonstrate an understanding of equilibrium of a particle and a rigid body
- Demonstrate an understanding of the basic concepts of thermodynamics
- Demonstrate an understanding of mass and energy balance analysis for closed and open systems
- Demonstrate an understanding of gas power cycles, vapor cycles and combined power cycles
- Demonstrate an understanding of stress and strain
- Demonstrate an understanding of mechanical properties of materials
- Demonstrate an understanding of axial loading, torsion, bending and transverse shear
- Demonstrate an understanding of stress and strain transformations

Additional Outcomes – Area of Concentration in Chemical Engineering

Upon successful completion of this concentration, students will also be able to:

- Demonstrate an understanding of modern atomic theory, atomic structure and the mole concept
- Write balanced chemical equations and solve equation stoichiometry problems
- Explain the trends of various atomic properties in the periodic table
- Demonstrate an understanding of the principles of chemical kinetics
- Demonstrate an understanding of the principles of chemical equilibrium
- Demonstrate an understanding of the bonding, structure, preparations, and reactions of organic compounds

Additional Outcomes – Area of Concentration in Computer Engineering

Upon successful completion of this concentration, students will also be able to:

- Demonstrate an understanding of units, engineering notations, and circuit terminology
- Demonstrate an understanding of Ohm's law, Kirchhoff's laws, and the Wye-Delta transformations

- Demonstrate an understanding of AC and DC circuit analysis
- Demonstrate an understanding of Laplace transform analysis technique
- Demonstrate an understanding of Boolean algebra and discrete combinational gates
- Analyze and design synchronous sequential circuits
- Demonstrate a basic understanding of computer programming

Program Requirements:

Engineering
Associate of Science

	General Education Requirements	*General Education Code*	*Credits*
ARTS/HUM	Arts and Humanities Elective[1]	H	3
EGL 101	Freshman Composition	E	3
EGL 102	Composition and Literature	H	3
MAT 121	Precalculus[2]	M	4
MAT 201	Calculus I with Analytic Geometry	M	4
PHY 217	General Physics I with Lab	SL	4
PHY 218	General Physics II with Lab	SL	4
SOC SCI	Social Science Electives[3]	SS	6
	Program Requirements		
MAT 202	Calculus II with Analytic Geometry	M	4
MAT 203	Multivariable Calculus	M	4
MAT 246	Introduction to Differential Equations	M	3
PHE 101	Introduction to Engineering Design		3
	Aerospace Engineering Concentration Requirements (20 Credits)		
CHM 103	General Chemistry I	S	3
CHM 104	General Chemistry II	S	3
CHM 113	General Chemistry I Lab		1
CHM 114	General Chemistry II Lab		1
PHE 211	Statics		3
PHE 212	Dynamics		3
PHE 213	Mechanics of Materials		3
PHE 221	Thermodynamics		3
	Chemical Engineering Concentration (19 Credits)		
CHM 103	General Chemistry I	S	3
CHM 104	General Chemistry II	S	3
CHM 113	General Chemistry I Lab		1
CHM 114	General Chemistry II Lab		1
CHM 203	Organic Chemistry I with Lab		4
CHM 204	Organic Chemistry II with Lab		4

PHE 211	Statics		3
	Computer Engineering Concentration **(18 Credits)**		
CSC 205	Computer Science I		3
MAT 236	Discrete Structures	M	3
MAT 240	Introduction to Linear Algebra	M	4
PHE 225	Electronics and Instrumentation		4
PHE 285	Principles of Electric Circuits		4
	Engineering Science Concentration[4] **(19-20 Credits)**		
CHM 103 **and** CHM 113	General Chemistry I	S	3
	General Chemistry I Lab		1
Or PHE 225	Digital Electronics and Instrumentation		4
CSC 205 **or** PHE 211	Computer Science I		3
	Statics		
ELECT	Engineering/Computer Science/Math/Science/Business Electives		12-13

Total Credits Required in Program: **63-65**

[1]Selection may not include EGL designation
[2]Students placed in MAT 201 or higher Math may replace MAT 121 with MAT, PHY, PHE, CSC or CHM elective(s) – **students must satisfy the four credit requirement**
[3]Courses must be from two different disciplines
[4]Should include at least one (1) course with PHE designation

Course Descriptions:

CHM 103 General Chemistry I studies the fundamental principles of chemistry including measurement, atomic structure, stoichiometry, energy relationships, chemical bonding, molecular structure, and gases. 3 credits
Pre-requisites: EGL 101, MAT 093
Co-requisite: CHM 113

CHM 104 General Chemistry II is a continuation of General Chemistry I. Topics include solutions, chemical kinetics, chemical equilibrium, acids and bases, equilibria in aqueous solution, chemical thermodynamics, electrochemistry, nuclear chemistry, and coordination chemistry. 3 credits
Pre-requisites: CHM 103, CHM 113
Co-requisites: CHM 114, MAT 121

CHM 113 General Chemistry I Lab will expose students to basic chemistry laboratory techniques and procedures such as sample preparation, data collection, gravimetric analysis and titration. Because this course is designed to complement the General Chemistry I lecture course,

conceptual topics include physical properties, determination of molecular weights, stoichiometry, energy, and gas laws. 1 credit
Co-requisite: CHM 103

CHM 114 General Chemistry II Lab will build upon the basic chemistry laboratory techniques and procedures learned in Chemistry 103. This course covers conceptual topics including qualitative analysis, chemical reactions in aqueous solution, acid-base reaction , reaction rates, chemical equilibrium, electrochemistry, and oxidation-reduction reactions. 1 credit
Pre-requisites: CHM 103, CHM 113
Co-requisite: CHM 104

CSC 205 Computer Science I is an introduction to the basic concepts of an object-oriented programming language such as Java or C++. This course introduces such programming concepts as data types, structures, decision making, looping, functions, arrays, files, and objects. 3 credits
Pre-requisites: CSC 106 and/or CSC 109 or permission of instructor

EGL 101 Freshman Composition teaches students the skills necessary to read college-level texts critically and to write effective, persuasive, thesis-driven essays for various audiences. The majority of writing assignments require students to respond to and synthesize texts (written and visual) through analysis and/or evaluation. Students also learn how to conduct academic research, navigate the library's resources, and cite sources properly. The course emphasizes the revision process by integrating self-evaluation, peer response, small-group collaboration, and individual conferences. Additionally, students are offered guided practice in appropriate style, diction, grammar, and mechanics. Beyond completing multiple readings, students produce approximately 5,000 words of finished formal writing in four-five assignments, including a 2,000-word persuasive research essay. 3 credits
Pre-requisites: C or better in COL081 and EGL093 or equivalent skills assessment

EGL 102 Composition and Literary Forms introduces the students to the genres of fiction, poetry, and drama in order to gain a fuller understanding and appreciation of these literary forms. Several brief compositions and a term paper will be assigned. 3 credits
Pre-requisites: Grade of C or better in EGL 101

MAT 121 Precalculus (M) prepares the student for the study of calculus, discrete mathematics, and other mathematics intensive disciplines through the study of algebraic, exponential, logarithmic, and trigonometric functions. Topics include functions, laws of logarithms, trigonometric and inverse trigonometric functions, trigonometric identities, solutions of trigonometric equations, the Laws of Sines and Cosines, and polar coordinates. A problem solving approach utilizes applications and a graphing calculator throughout the course. 4 credits
Pre-requisite: Grade of C or better in MAT093, EGL093

MAT 201 Calculus I with Analytic Geometry (M) introduces students to the mathematical techniques for limits (including L'Hospital's Rule), differentiation, and integration of algebraic, trigonometric, inverse trigonometric, logarithmic, exponential, hyperbolic, and inverse hyperbolic functions. Applications of differentiation and integration are studied. 4 credits
Pre-requisites: EGL 093 and grade of C or better in MAT 121

MAT 202 Calculus II with Analytic Geometry introduces integration techniques, improper integrals, sequences, infinite series, conic sections and polar coordinates. Students will solve applied problems related to limits, differentiation, integration, and infinite series. A computer algebra system, such as Maple, is introduced and used. 4 credits
Pre-requisite: C or better in MAT 201

MAT 203 Multivariable Calculus provides the student with a study of three-dimensional space, introduction to hyperspace, partial differentiation, multiple integration, vectors in a plane, and topics in vector calculus to include Green's Theorem, Stokes' Theorem, and the divergence theorem. Knowledge of a computer algebra system, MAPLE, is expanded. 4 credits
Pre-requisite: MAT 202

MAT 236 Discrete Structures introduces the fundamental tools, topics, and concepts of discrete mathematics. This course emphasizes counting methods, proof techniques, and problem-solving strategies. Topics include Boolean algebra, set theory, symbolic logic, predicate calculus, number theory, the methods of proofs (direct, indirect, and inductive), objective functions, equivalence relations, graphs, set partitions, combinatorics, modular arithmetic, summations, and recurrences. 3 credits
Pre-requisite: MAT 201

MAT 240 Introduction to Linear Algebra introduces the basic concepts of linear algebra: vector spaces, applications to line and plane geometry, linear equations and matrices, linear transformations, eigenvalues, determinants, and quadratic forms. 4 credits
Pre-requisite: Grade of C or better in MAT 202 or permission of the Math Department Chair

MAT 246 Introduction to Differential Equations introduces the basic techniques for solving and/or analyzing first and second order differential equations, both linear and nonlinear, and systems of differential equations. The use of a mathematical software system is an integral part of the course. 3 credits
Pre-requisite: Grade of C or better in MAT 202

PHE 101 Introduction to Engineering Design is a project-based course that introduces the product development process. Working in teams and using modern computer tools, students complete the design of a complex system requiring problem specification, product research, product design, product modeling and analysis, fabrication, testing, redesign, and product presentation. Engineering fundamentals such as units and dimensions, CAD modeling and analysis, creation of engineering drawings, data analysis with spreadsheets, properties of materials, mechanics, heat transfer, circuits, computer programming and other engineering topics are studied. 3 credits
Co-requisite: MAT 201

PHE 211 Statics will introduce students to the study of the equilibrium of bodies (both solids and fluids) under the influence of various kinds of loads. Forces, moments, couples, equilibrium of a particle, equilibrium of a rigid body, analysis of trusses, frames and machines, internal forces in structural members, friction, center of gravity, centroids, composite bodies, and fluid

pressure are topics which will be considered. Vector and scalar methods are used to solve problems. Conceptual understanding will be integrated with problem-solving. 3 credits
Pre-requisites: PHY 217 and MAT 202

PHE 212 Dynamics will introduce students to the study of systems of heavy particles and rigid bodies at rest and in motion. Force, acceleration, work-energy, and impulse-momentum relationships, motion of one body relative to another in a plane and in space are topics which will be considered. Vector and scalar methods are used to solve problems. Conceptual understanding will be integrated with problem-solving. 3 credits
Pre-requisite: PHE 211

PHE 213 Mechanics of Materials will introduce students to the study of stress and deformation of beams, shafts, columns, tanks, and other structural, machine, and vehicle members. Topics include stress transformation using Mohr's circle, centroids and moments of inertia, shear and bending moment diagrams, derivation of elastic curves, and Euler's buckling formula. Conceptual understanding will be integrated with problem-solving. 3 credits
Pre-requisite: PHE 211

PHE 221 Thermodynamics will introduce students to the interaction between heat and mechanical energy in materials and machines and its application to mechanical systems. Topics covered include first and second laws of thermodynamics, cycles, reactions, and mixtures, fluid mechanics, heat transfer, fluid-energetics laboratory, and the application of these engineering sciences to energy systems design. Conceptual understanding will be integrated with problem-solving. 3 credits
Pre-requisites: PHE 211 and PHY 218

PHE 225 Digital Electronics and Instrumentation with Lab will introduce students to the science of digital design. The topics covered include: Boolean algebra, logic theorems, logic circuits and methods for their simplification (Karnaugh maps), gates, timing, arithmetic circuits, flip flops, programmable logic arrays (PLAs), sequential circuits and similar devices. The student will gain an understanding of digital design principles and will simulate, construct and analyze digital circuits using industry standard circuit design software along with a digital breadboard. Problem-solving and electrical laboratory skills will be emphasized in this course. 4 credits
Pre-requisites: PHE 185 or PHY 208

PHE 285 Principles of Electric Circuits with Lab will introduce students to the analysis, simulation, construction, and evaluation of analog electrical circuits. The topics covered include: Kirchhoff's laws, Thévenin's and Norton's theorems, node and mesh analysis, DC and AC steady state and transient analysis for first and second order circuits, operational amplifiers and diode elements, as well as Laplace transform analysis. Problem-solving, software simulation, and electrical laboratory skills will be emphasized in this course. 4 credits
Pre-requisite: PHY 208
Co-requisite: MAT 246

PHY 217 General Calculus Physics I with Lab (SL) is the first course of a three semester calculus-based general physics course sequence. This course provides a comprehensive introduction for students interested in physics and engineering. Topics related to mechanics include linear and rotational kinematics and dynamics, energy and momentum conservation, collisions, equilibrium of rigid bodies, and oscillations. Problem-solving and laboratory skills will be emphasized in this course. Previous exposure to physics principles and strong mathematics skills are highly recommended. 4 credits
Prerequisite: MAT 121
Co-requisite: MAT 201

PHY 218 General Calculus Physics II with Lab (SL) is the second course of a three semester calculus-based general physics course sequence. This course provides a comprehensive introduction to students interested in physics and engineering. Topics include: thermodynamics, electricity, magnetism, and radioactivity. Problem-solving and laboratory skills will be emphasized in this course. 4 credits
Prerequisite: PHY 217 with a C or better
Co-requisite: MAT 202

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

The job outlook for engineers is shaped both by society's growing need to devise solutions to technically challenging problems — global warming, a shortage of clean water, the demand for faster and smarter computing — and by short supply. Only 4.5 percent of all undergraduates come out of school with engineering degrees, according to the National Science Foundation.[1]

Engineering is the discipline, art, and profession of acquiring and applying technical, scientific, and mathematical knowledge to design and implement materials, structures, machines, devices, systems, and processes that safely realize a desired objective or invention. Engineers solve problematic technical issues by using the fundamentals of math and science to develop cost effective solutions. Engineers not only work in the development and design of new products, they also work in the testing, production, and maintenance of new products. Engineers oversee production assembly lines, determine why products break down, and administer tests to improve product quality. They also determine how much money and time is necessary to finish projects.

The broad discipline of engineering encompasses a range of sub-disciplines, including Aerospace Engineering, Civil Engineering, Chemical Engineering, Electrical Engineering, and Mechanical Engineering.

The proposed program meets the critical and compelling regional and statewide need outlined in Goal 5 of *Maryland Ready: 2013 Maryland State Plan for Postsecondary Education* – "Maryland will stimulate economic growth, innovation, and vitality by supporting a knowledge-based economy, especially through increasing education and training and promoting the advancement and commercialization of research."

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[1] You're an Engineer: You're Hired. *U.S. News & World Report,* March 2012.

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

According to the Maryland Department of Labor, Licensing, and Regulation, there are **total annual openings of 3,223** when searching using the keyword "engineer." When narrowing total openings to specific areas of concentration (matching to the areas of concentration for the proposed degree) the following **3,617 openings are forecast in Maryland through 2022:**[2]

Occupational Title	2012 Employment	2022 Employment	Change	Replacements	Total Openings
Aerospace Engineers	3,175	3,238	63	738	801
Chemical Engineers	801	812	11	186	197
Computer Engineers	4,899	5,467	568	1,056	1,624
Engineers – All others	4,779	4,896	116	879	995
				Total	**3,617**

These 3,617 openings require a Bachelor's degree. However, there are also many engineering – related occupations that require an Associate's degree. According to the Maryland Department of Labor, Licensing, and Regulation, **the following 2,941 engineering related openings are forecast in Maryland through 2022 for individuals possessing an Associate's degree:**[3]

Occupational Title	2012 Employment	2022 Employment	Change	Replacements	Total Openings
Electrical and Electronics Drafters	848	917	69	113	182
Mechanical Drafters	853	791	-62	114	114
Drafters, all other	230	255	25	31	56
Aerospace Engineering and Operations Technicians	282	251	-31	58	58
Civil Engineering Technicians	1,506	1,471	-35	312	312
Electrical and Electronics Engineering Technicians	3,746	3,879	133	776	909
Electro-Mechanical Technicians	150	142	-8	31	31
Environmental Engineering Technicians	359	413	54	74	128

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[2] Maryland Department of Labor, Licensing, and Regulation – Architecture and Engineering Occupations – Maryland Occupational Projections, retrieved from http://www.dllr.maryland.gov/lmi/iandoproj/occgroup17.shtml.
[3] Ibid.

Occupational Title	2012 Employment	2022 Employment	Change	Replacements	Total Openings
Industrial Engineering Technicians	594	540	-54	123	123
Mechanical Engineering Technicians	1,041	1,126	85	216	301
Engineering Technicians, except drafters, all other	3,218	3,278	60	667	727
				Total	**2,941**

It is interesting to note that most of the annual openings are driven by the need to replace current workers, which is probably due in part to the aging workforce. According to the data, regardless of whether students transfer to a 4-year program or not, the job market is very promising for students who successfully complete the proposed program.

E.   Reasonableness of program duplication:

A search of the Maryland Higher Education Commission's Academic Program Inventory database reveals the following similar programs in the state:

Institution	Program Name	Degree Offered
Anne Arundel Community College	ENGINEERING TRANSFER	Associate Degree
Baltimore City Community College	ENGINEERING TRANSFER	Associate Degree
College of Southern Maryland	ENGINEERING TRANSFER	Associate Degree
Community College of Baltimore County	ENGINEERING	Associate Degree
Harford Community College	ENGINEERING TRANSFER	Associate Degree
Howard Community College	ENGINEERING TRANSFER	Associate Degree
Montgomery College-All Campuses	ENGINEERING SCIENCE	Associate Degree
Prince George's Community College	ENGINEERING	Associate Degree
Washington Adventist University	ENGINEERING	Associate Degree

The closest location to Cecil's campus is Harford Community College. However, since Harford is located more than 20 miles from our campus, our program will not compete with Harford's.

Cecil College has offered the proposed program and concentrations as options under the Arts and Sciences Transfer degree for many years without any detrimental impact on other programs in the state.

F.   Relevance to Historically Black Institutions (HBIs)
No impact is anticipated on the state'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).

Not applicable.

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

Faculty Member	Credentials	Status	Courses Taught
Josiah Bancroft, Assistant Professor of English	M.A. Literature, Virginia Commonwealth University	Full-time	EGL 102 Composition and Literature
Brandy Biddy, Assistant Professor of Mathematics	M.S., John's Hopkins University	Full-time	MAT 246 Introduction to Differential Equations
Edward E. Boas Jr., Professor of Computer Science	Ed.D., Temple University	Full-time	CSC 205 Computer Science I Computer Science electives
John Climent, Professor of Mathematics	Ph.D., University of Delaware	Full-time	MAT 203 Multivariable Calculus
Jack Cohen, Assistant Professor of Sociology and Psychology	M.Div. Eastern/Palmer Theological Seminary	Full-time	Social Science Electives
Veronica Dougherty, Professor of Biology	Ph.D., University of Connecticut	Full-time	Science Electives

Kristy Erickson, Professor of Mathematics	Ed.D. Walden University	Full-time	MAT 121 Precalculus MAT 201 Calculus I with Analytic Geometry MAT 202 Calculus II with Analytic Geometry MAT 236 Discrete Structures
Craig Frischkorn, Professor of English	Ph.D., English State University of New York at Buffalo	Full-time	EGL 101 Freshman Composition
Joseph Kupresanin, Associate Professor of Mathematics	M.A.S. The Ohio State University	Full-time	MAT 240 Introduction to Linear Algebra
Anand Patel, Assistant Professor of Engineering and Physics	M.S. Mechanical Engineering, University of Maryland Baltimore County	Full-time	PHE 101 Introduction to Engineering Design PHE 211 Statics PHE 212 Dynamics PHE 213 Mechanics of Materials PHE 221 Thermodynamics
Ebony Roper, Assistant Professor of Chemistry	Ph.D., Howard University	Full-time	CHM 103 General Chemistry I CHM 113 General Chemistry I Lab CHM 104 General Chemistry II CHM 114 General Chemistry II Lab CHM 203 Organic Chemistry I with Lab CHM 204 Organic Chemistry II with Lab
Jacqueline Wilson, Assistant Professor of Computer Science	M.A. Information Management Systems, Harvard University	Full-time	Computer Science electives
Gail Wyant, Professor of Physics	M.S., State University of New York at Stony Brook	Full-time	PHY 217 General Calculus Physics I with Lab PHY 218 General Calculus Physics II with Lab
James Evangelos, Adjunct	M.S. Electrical Engineering, University of South Florida	Part-time	PHE 225 Digital Electronics and Instrumentation with Lab PHE 285 Principles of Electric Circuits with Lab

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

Cecil College's Cecil County Veterans Memorial Library is a member of Maryland Digital Library and the Maryland Community College Library Consortium.

Students enrolled in Associate of Science Engineering with concentrations in aerospace, chemical, computer, and engineering science have on-campus and off-campus access to the following relevant databases: EBSCOhost's Academic Search Complete, EBSCO's eBook Academic Collection (contains over 140,000 titles), ProQuest Central, and ProQuest Science. Titles within these resources include: Aerospace Daily & Defense Report, Aerospace Power Journal, Chemical Engineering, Chemical Engineering Communities, Chemical Engineering Progress, Chemical Engineering Research Bulletin, Acta Technia Corviniensis – Bulletin of Engineering, Advances in Sustainable Petroleum Engineering Science, Engineering & Technology, Journal of Computer Science, and Mathematical Structures in Computer Science. Instructors have the option to place textbooks and DVDs on reserve in the library for their courses, or the library can purchase textbooks and DVDs to place on reserve for student use. The library staff welcomes and encourages faculty to submit requests for books, multi-media resources and databases to support their instruction. Students and faculty can submit Inter-Library Loan requests for books and articles.

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

The Engineering Program is housed on the North East campus in the Engineering and Math building. The Engineering and Math building houses the program labs and classrooms, student lounge, and conference rooms. Engineering students will also have the opportunity to utilize additional physical facilities on campus including the Library; and the Technology/Conference Center, housing a computer lab, and a student lounge /dining area.

In the Engineering and Math building, the Engineering program has two dedicated classrooms, one dedicated machine shop and one printer room. The classrooms are equipped with desks, chairs, locked storage areas, a sink, counter top, whiteboard and computer projector system for Power Point, Blackboard and Internet access. The classrooms are also equipped with computers and laptops that allow engineering students to access CAD software like AutoCAD and SolidWorks, programming languages like C, C++ and MATLAB, along with other software like MS Word, MS Excel and MS PowerPoint. The Machine Shop is a spacious room equipped with materials and equipment for students to work on a variety of lab experiments and projects, providing them with technical skills and hands-on experience. The Printer Room is equipped with a 3-D printer that allows students to import and print designs from CAD software.

The Engineering Program has sufficient dedicated office space for program faculty and staff and students. The faculty offices includes table and chairs available for private conferences with students and/or faculty, bookshelves for department resources and four locked file cabinets to secure program materials. On the second floor of the Engineering and Math building, there is also dedicated office space for adjunct faculty. The adjunct office is equipped with computers, desks, chairs and telephones. A conference room is available for faculty meetings and or private

conferences with students. In a faculty work area, the faculty has access to table, chairs, faculty mailboxes, as well as a copy and fax machine. Also in this work area are a refrigerator, sink, cupboards and microwave for faculty use.

Program faculty and students utilize technology systems to enhance teaching and learning experiences and to support the technical educational experiences as evident in the curriculum. Available technology includes state-of-the-art electronic classrooms with interactive white boards, projection systems, immediate capture and documentation cameras, wireless internet access; and the college-wide Course Management System 'Blackboard', which can provide on-line learning to supplement courses.

The North East campus computer lab, housed in the Technology Center, provides 28 computers and technology resource staff, during regular lab hours, to assist students. Engineering faculty works closely with the Technology Resources department to provide up-to-date hardware and software to faculty and students.

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

Please see tables that follow on the next two pages.

Cecil College – AS Engineering
Projected Revenues

TABLE 1: RESOURCES					
Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated funds	N/A	N/A	N/A	N/A	N/A
2. Tuition/Fee revenue (c+g below)	$66,900	$75,500	$89,400	$100,000	$119,200
a. Number of F/T students	13	15	18	20	24
b. Annual Tuition/Fee Rate	$100/credit	$100/credit	$100/credit	$100/credit	$100/credit
c. Total F/T Revenue (a * b)	$42,900	$49,500	$59,400	$66,000	$79,200
d. Number of P/T students	12	13	15	17	20
e. Credit Hour Rate	$100/credit	$100/credit	$100/credit	$100/credit	$100/credit
f. Annual Credit Hour Rate	N/A	N/A	N/A	N/A	N/A
g. Total P/T Revenue (d * e * f)	$24,000	$26,000	$30,000	$34,000	$40,000
3. Grants, Contracts, & Other External Sources	0	0	0	0	0
4. Other sources: Student Dev. Fees Registration Fees	$5,352 $3,750	$6,040 $4,200	$7,152 $4,950	$8,000 $5,550	$9,536 $6,600
Total (Add 1-4)	$76,002	$85,740	$101,502	$113,550	$135,336

Assumptions:

- Tuition revenue is conservatively projected based on an in-county rate of $100/credit
- Full-time students complete 33 credits per year on average; Year one tuition revenue = 13 students * 33 credits = 429 total credits; 429 credits * $100/cr. = $42,900
- Part-time students complete 20 credits per year on average; Year one tuition revenue = 12 students * 20 credits = 240 credits * $100/cr. = $24,000
- Student Development Fee is $8/credit hour; Fees for year one = 669 total credits * $8 = $5,352
- Registration fee = $75/semester; registration fees are assumed to be two semesters each year or $150, but students may elect to also take courses in the summer; Year one registration fees = 25 students * $150 = $3,750

TABLE 2: EXPENDITURES					
Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	$75,365	$76,606	$77,869	$79,154	$80,461
a. #FTE	1.0	1.0	1.0	1.0	1.0
b. Total Salary	$55,370	$56,200	$57,043	$57,899	$58,767
c. Total Benefits	$19,995	$20,406	$20,826	$21,255	$21,694
2. Administrative 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)	$75,365	$76,606	$77,869	$79,154	$80,461

Assumptions:

- One full-time faculty member's salary is allocated at .75 of time and one faculty member's salary is allocated at .25 of time
- Library resources and equipment are budgeted in the operating budget on an ongoing basis.
- Salaries are forecasted to increase @ 1.5% each year
- Health benefits are forecasted to increase @ 2.5% each year

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

Individual course assessment reports document student learning outcomes which are taken directly from the course syllabus. The Assessment Committee has established a rubric for course assessment reports which requires documentation of desired learning outcomes (taken from the syllabus), indicators of student learning outcomes, direct and indirect methods of assessment, quantitative and qualitative data on student performance, and how assessment results will be used to further improve student learning outcomes in the future. Each report is reviewed to ensure that it meets the guidelines established by the Assessment Committee. Reports are collected for one-third of all courses offered during the fall and spring semesters each academic year, resulting in a review of all courses within 36 months.

Faculty members are evaluated each and every semester by students enrolled in their courses. The College uses an electronic survey process (Evaluation Kit) and students are required to complete the evaluation within a specified time frame at the end of the semester or they are locked out of the learning management system (Blackboard) until they complete the survey. This has resulted in a very high response rate for all courses.

The College has an established Program Review Policy and a Program Review and Assessment Plan. Both of these documents have been endorsed by the Faculty Senate and approved by the Board of Trustees. One-fifth (20%) of the programs are reviewed each year so that all programs are reviewed on a five-year cycle. A repository, which is accessible to all faculty members, is kept for all Program Review and Assessment documents. Additionally, a database has been established to track the status of recommended changes/revisions to programs.

Faculty members are assessed in the classroom by the Dean of Academic Programs each year for their first five years at Cecil College and every three years thereafter.

All faculty members are contractually obligated to complete an annual report: inclusive of assessment results.

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).

Cecil College has qualified professional staff in the student advising and student support areas. Advisors seek and support other-race students consistent with the core values of the College, which encompass diversity and inclusiveness. In addition, the College has adopted a Strategic Initiative to "create educational opportunities for a diverse community of learners." The College plans to employ broad recruitment efforts to attract a racially diverse student body. Statements of non-discrimination are included in College publications and will appear in any marketing pieces for the program. In addition, the Director of Minority Student Services will assist in marketing and referring students to the new program.

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

Not applicable.