CECIL COLLEGE

December 3, 2019

James D. Fielder, Jr., Ph.D.
Secretary of Higher Education
Maryland Higher Education Commission
6 North Liberty Street
Baltimore, MD 21201

Dear Dr. Fielder:

Attached is a proposal for a new Associate of Science program:

AS Computer Science
HEGIS Code 0701.00; CIP Code 11.0101

This program will replace currently existing option within our Arts and Sciences Transfer degree.

Our check for $850 is enclosed to cover the Commission's fee for a new program.

If there are any questions about this request, please contact Colleen Flewelling, Associate Dean of Academic Assessment and Development, at cflewelling@cecil.edu or 443-674-1948.

Sincerely,

Christy Dryer, DNP
Vice President, Academic Programs

Office Use Only: PP#

MHEC
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Cover Sheet for In-State Institutions
New Program or Substantial Modification to Existing Program

Institution Submitting Proposal	Cecil College

Each action below requires a separate proposal and cover sheet.

- (●) New Academic Program
- ( ) New Area of Concentration
- ( ) New Degree Level Approval
- ( ) New Stand-Alone Certificate
- ( ) Off Campus Program
- ( ) Substantial Change to a Degree Program
- ( ) Substantial Change to an Area of Concentration
- ( ) Substantial Change to a Certificate Program
- ( ) Cooperative Degree Program
- ( ) Offer Program at Regional Higher Education Center

Payment Submitted: (●) Yes ( ) No

Payment Type: ( ) R*STARS (●) Check

Date Submitted:

Department Proposing Program	Science and Technology	
Degree Level and Degree Type	AS	
Title of Proposed Program	Computer Science	
Total Number of Credits	60	
Suggested Codes	HEGIS: 70100	CIP: 110101
Program Modality	(●) On-campus ( ) Distance Education (*fully online*) ( ) Both	
Program Resources	(●) Using Existing Resources ( ) Requiring New Resources	
Projected Implementation Date	( ) Fall (●) Spring ( ) Summer	Year: 2020
Provide Link to Most Recent Academic Catalog	URL: https://www.cecil.edu/catalog	
Preferred Contact for this Proposal	Name: Colleen Flewelling	
	Title: Associate Dean of Academic Assessment and Development	
	Phone: (443) 674-1948	
	Email: cflewelling@cecil.edu	
President/Chief Executive	Type Name: Mary W. Bolt	
	Signature: Mary W Bolt	Date: 11/19/19
	Date of Approval/Endorsement by Governing Board:	10/28/2019

Revised 6/13/18

CECIL COLLEGE
NEW PROGRAM PROPOSAL
AS COMPUTER SCIENCE
HEGIS 0701.00 CIP 11.0101

A. Centrality to institutional mission statement and planning priorities:

Cecil College's Associate of Science in Computer Science prepares students to transfer to a four-year institution for continued study in computer science. Computer scientists apply techniques to work with industry, the government and academia to solve computational challenges. Students with bachelor's degrees in computer science continue their education in graduate school or enter the work force.

Cecil College currently offers a Computer Science Option within the Arts and Sciences Transfer degree. This new stand-alone program will replace the option.

Thus, this program directly supports Cecil College's mission to provide a supportive learning environment to students as they build the skills and knowledge to achieve academic success, prepare to transfer, and enter the workforce.

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

The AS in Computer Science prepares students for further study in a Computer Science program at a four-year institution. Students' expenses for their degree are greatly reduced when they complete two years of their degree at Cecil College. The chart below compares tuition at 4-year state institutions which have Computer Science programs with the cost of attending Cecil College. Decreased expenses allow many students to complete a degree they would otherwise be unable to complete, supporting goal 2 (Success) of the Maryland State Plan for Education.

Institution	Rate	Cost per credit 2018-19	Cost for 60 credits	Savings over 2 years
Cecil College	In-county	$119	$7,140	-
Morgan State University	In-state	$250	$15,000	$7,860
Frostburg State University	In-state	$267	$16,020	$8,880
Towson University	In-state	$288	$17,280	$10,140
University of Maryland Baltimore County	In-state	$356	$21,360	$14,220
University of Maryland College Park	In-state	$360	$21,600	$14,460

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

A Computer Science degree prepares students for several fields in information technology. Examples of these fields include software development, system analyst, and database administrator. Maryland's Department of Labor projects an increase from 2016-2026 in the number of openings for these types of positions.[1]

Field	2016-2026 Percent Change in openings in Maryland
Software Developers	+7.4%
Computer System Analysts	+7.6%
Network and Computer Systems Administrators	+7.8%
Database Administrators	+7.5%
Computer and Information System Manager	+6.3%

Cecil College anticipates that the demand for this program will continue to grow.

D. Reasonableness of program duplication:

A search of the Maryland Higher Education Commission's Academic Program Inventory database reveals several other Associate degree programs in Computer Science in Maryland.

Institution	Program Name	Degree Offered
Allegany College of Maryland	Computer Science Transfer	Associate
Anne Arundel Community College	Computer Science Transfer	Associate
College of Southern Maryland	Computer Science	Associate
Community College of Baltimore County	Computer Science	Associate
Frederick Community College	Computer Science	Associate
Garrett College	Computer Science	Associate
Hagerstown Community College	Computer Science	Associate
Harford Community College	Computer Science Transfer	Associate
Howard Community College	Computer Science Transfer	Associate
Montgomery College	Computer Science and Technologies	Associate
Prince George's Community College	Computer Science Transfer	Associate
Wor-Wic Community College	Computer Studies Transfer	Associate

[1] http://dllr.maryland.gov/lmi/iandoproj/maryland.shtml

According to COMAR 13B.02.03.09, "proposed programs in undergraduate core programs consisting of basic liberal arts and sciences disciplines are not considered unnecessarily duplicative." This AS program in Computer Science is a basic science discipline, preparing students for further study in a bachelor's degree program, and is therefore not duplicative.

E. Relevance to high-demand programs at Historically Black Institutions (HBIs)

We anticipate there will be no impact on the implementation or maintenance of high-demand programs at HBI's.

F. Relevance to the identity of Historically Black Institutions (HBIs)

Bachelor's degree programs in Computer Science are offered at University of Maryland Eastern Shore, Coppin State University, Morgan State University, and Bowie State University. Because Cecil's AS program in Computer Science is designed as a transfer program, graduates could choose to attend any of these institutions.

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

The following information on degree requirements, learning outcomes, and course descriptions will be made available to students in the college catalog, which is available on the Cecil College website. Students may also consult with advisors and faculty members to learn about these programs.

Information about new programs is clearly and accurately represented in advertising, recruiting, and admissions materials. The College's Academic Programs unit widely shares information about the requirements for new or changed degrees in MHEC-approved programs. The Admissions and Marketing departments use this information to update application and inquiry forms, internal recruitment products, and other marketing materials.

Faculty at Cecil College design all courses and programs, which are then presented to the Academic Affairs Committee, a committee comprised primarily of faculty, for approval.

The proposed AS program in Computer Science requires the following courses:

Course Code	Courses (30 Credits)	Credits
CSC 104	Computer Science Fundamentals I	3
CSC 109	Introduction to Programming	3
CSC 205	Computer Science I	3
CSC 218	Computer Science II	4
MAT 201	Calculus I with Analytic Geometry	4
MAT 202	Calculus II with Analytic Geometry	4
MAT 236	Discrete Structures	3
MAT 240	Intro to Linear Algebra	4

PHE or CSC	Electives (Engineering or Computer Science)	2

Total Credits: 30

COURSE DESCRIPTIONS

CSC104 Computer Science Fundamentals (I) is specifically designed as an introductory course for computer, engineering, math and science students to prepare them for the digital world. Readings, research, and activities in this course are designed to help students develop a framework for technology concepts that are applicable to academic research, career preparation, and today's digital lifestyle in these specific fields. Credits: 3

CSC109 Introduction to Programming covers the core concepts and techniques of Programming using C++ and Visual Basic that are needed to logically plan and develop programs using object oriented programming and design. Credits: 3

CSC205 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. Credits: 3 Prerequisites: CSC106 and/or CSC109 or permission of instructor

CSC218 Computer Science II continues the development of object-oriented programming and problem-solving skills by using an object-oriented language such as Java or C++. The student will obtain a solid foundation in advanced object-oriented topics such as abstract data types, overload operators, dynamic memory, exception handling, inheritance, and polymorphism. The student will also examine data structures such as stacks, queues, and trees, as well as perform efficiency analysis on searching and sorting algorithms. Credits: 4 Prerequisites: CSC205, MAT201 or consent of instructor

MAT201 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. Credits: 4 Prerequisites: EGL093 and grade of C or better in MAT121

MAT202 Calculus II with Analytic Geometry (M) 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. Credits: 4 Prerequisite: Grade of C or better in MAT201

MAT236 Discrete Structures (M) 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. Credits: 3 Prerequisite: MAT201

MAT240 Introduction to Linear Algebra (M) introduces the basic concepts of linear algebra: vector spaces, applications to line and plane geometry, linear equations and matrices, similar matrices, linear transformations, eigenvalues, determinants, and quadratic forms. A computer algebra system will be used. Credits: 4 Prerequisite: Grade of C or better in MAT202 or permission of the Math Department Chair

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

- Analyze a problem; then identify and describe the computing requirements appropriate to its solution
- Create or evaluate computer-based systems or processes as a solution for desired results or outcomes
- Apply algorithmic principles and computer science theory in modeling problems and processes in the physical world
- Communicate and function effectively on teams working towards a common goal

In addition, all Computer Science students take the following General Education requirements

General Education Requirements (30 credits)		General Education Code	Credits
ART/HUM	Arts and Humanities Elective	H	3
EGL 101	College Composition	E	3
EGL 102	Composition and Literature	H	3
MAT 121	Precalculus	M	4
SCI*	BIO or ENV or CHM or PSC or PHY	S/SL	8
SOC SCI	Social Science Electives	SS	6
SPH 121	Interpersonal Communication	H	3

***** Transfers to BS program require 2 semesters of same science discipline; BA programs allow sciences to be in same or different disciplines

EGL101 College Composition (E) 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 a minimum of 7,500 words, approximately 5,000 words of which are finished formal writing in four-five assignments, including a 2,000-word persuasive research essay. 3 credits. Pre-requisites: C or better in COL 081 and EGL 093 or equivalent skills assessment.

EGL102 Composition & Literature (H) introduces 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 an analytical research paper are assigned. Credits: 3 Prerequisite: EGL101

MAT121 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 vectors. A problem solving approach utilizes applications and a graphing calculator throughout the course. Credits: 4 Prerequisites: EGL093, grade of C or better in MAT093 or MAT098
SPH121 Interpersonal Communications (H) is a survey course covering all facets of human communication. The course emphasizes basic communication skills and awareness of what contributes to effective communicating, as well as what contributes to messages miscommunicated. It also provides students with practice in verbal and listening skills. Students relate communication learning to all areas of life and career skills. Classroom discussions, activities, and experiments on a variety of topics are used as a basis for students' growing awareness of perception and skills in communication. Credits: 3 Corequisite: EGL093

Cecil College does not contract with another institution or non-collegiate organization in providing this program.

H. Adequacy of articulation

Cecil College is pursuing an articulation agreement with Wilmington University (in Delaware) for this program.

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

Faculty Member	Credentials	Status	Courses Taught
Christopher Castillo, Associate Professor of Mathematics	Ph.D. University of Delaware (Mathematics)	Full-time	MAT 201 Calculus I with Analytic Geometry
Christopher Gaspare, Assistant Professor of English	M.A. Washington College (English)	Full-time	EGL 101 Freshman Composition
Nathanael Tagg, Associate Professor of English	M.F.A. Rutgers University (English)	Full-time	EGL 102 Composition and Literature
John Climent, Professor of Mathematics	Ph.D. University of Delaware (Statistics)	Full-time	MAT 121 Precalculus MAT 240 Introduction to Linear Algebra
Anne Edlin, Professor of Mathematics	Ph.D. Temple University (Mathematics)	Full-time	MAT 202 Calculus II with Analytic Geometry MAT 236 Discrete Structures
Jacqueline Wilson, Assistant Professor of Computer Science	A.L.M. Harvard University (Information Management Systems)	Full-time	CSC 109 Introduction to Programming CSC 205 Computer Science I CSC 218 Computer Science II
James Morgan, Associate Professor of Computer Science	Ph.D. Capella University (Information Technology)	Full-time	CSC 104 Computer Science Fundamentals

Faculty Member	Credentials	Status	Courses Taught
Christopher Castillo, Associate Professor of Mathematics	Ph.D. University of Delaware (Mathematics)	Full-time	MAT 201 Calculus I with Analytic Geometry
Lori Channell	M.Ed. Grand Canyon University (Secondary Education)	Part-time	SPH 121 Interpersonal Communications

Faculty have several opportunities for ongoing professional development in pedagogy. Cecil College's instructional technologist offers regular workshops on using technologies to improve both face-to-face and online teaching. In addition, each semester she offers the Quality Matters-based Professional Development for Online Teaching (PDOT) course on best practices in online teaching. The College also funds faculty participation in academic conferences, including conferences focused on pedagogical topics. In January 2019, Cecil College hosted the annual conference of the Association of Faculties to Advance Community College Teaching (AFACCT); more than 35 full-time and adjunct faculty attended. In 2018-19, Cecil College also piloted the Faculty Guild professional development program with selected full-time and part-time faculty; six additional faculty members are participating in this program in 2019-20.

J. 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 (MDL) and the Maryland Community College Library Consortium (MCCLC). CCVM Library has reciprocal borrowing privileges with other community college libraries within the state of Maryland. CCVM Library also subscribes to Inter-Library Loan, where students and faculty can request physical books, eBooks, and scholarly articles from institutions in other states.

Computer science students can make an appointment to meet one-on-one or in groups with the Instructional Librarian for assistance with the following: narrowing down a research topic, finding articles in the library databases, finding books and eBooks, evaluating resources, and crafting citations. The Instructional Librarian also visits classes upon request to teach library information sessions tailored to class projects and curricula.

The library subscribes to approximately 84 online databases that cover the majority of disciplines offered at Cecil College. The following databases in particular may help most with varying aspects of computer science: Academic Search Complete, ProQuest Central, Computing, Career and Technical Education, Library Science, Library Information Science and Information Technology Abstracts, Military and Government Collection, Telecommunications, and Science.

CCVM Library offers both a physical book collection and an online eBook collection for student use related to computer science, as well as a list of open resources on its Open Educational Resources (OER) LibGuide that both students and faculty can utilize. An eBook search of "computer science" yielded over 3016 results. The library also has a number of program required textbooks on reserve for students to use in the library. CCVM Library staff welcomes and encourages faculty to submit requests for books, multi-media resources, and databases to support student projects and teacher instruction throughout the academic year.

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

All students have the opportunity to utilize all physical facilities on campus including the Library; the Arts and Sciences Building; the Engineering and Math Building; Physical Education Complex; and the Technology/Conference Center, housing the computer lab, a student lounge / dining area and a Conference Center.

Two newly renovated computer science classrooms, which are available for lab use outside of scheduled class times, are equipped with new workstations running all current operating systems (Mac OS, Windows OS, and Linux). These rooms have dedicated high-speed internet access, network and virtual reality equipment for student lab use, and Raspberry Pis, Pyboards, and Adruinos for student lab use. One of the classrooms also includes six rack-mounted servers.

The department has sufficient dedicated office space for program faculty, staff, and students. Faculty offices include a desk and multiple chairs available for private conferences with students and/or faculty, bookshelves for department resources, and a locked file cabinet to secure program materials.

There is also dedicated office space for adjunct faculty. The adjunct offices are equipped with computers, desks, chairs, and telephones.

Multiple conference rooms are available for faculty meetings and or private conferences with students in the Engineering and Math Building, the Arts and Science Building, and the Physical Education Complex.

Available technology includes state-of-the-art smart 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. The Writing Center is a free service to all Cecil College students. Tutors are available during a variety of day and evening hours to assist students with reading and writing assignments in any subject. Free subject matter tutoring is also available to all students upon request.

L. 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)	$117,810	$124,630	$137,875	$146,304	$159,296

a.	Number of F/T students	10	10	11	11	12
b.	Annualized Tuition/Fee Rate[2]	$3,927	$3,993	$4,125	$4,224	$4,323
c.	Total F/T Revenue (a x b)	$39,270	$39,930	$45,375	$46,464	$51,876
d.	Number of P/T students	33	35	37	39	41
e.	Credit Hour Rate	$119	$121	$125	$128	$131
f.	Annualized Credit Hour Rate[3]	$2,380	$2,420	$2,500	$2,560	$2,620
g.	Total P/T Revenue (d x e x f)	$78,540	$84,700	$92,500	$99,840	$107,420
3.	Grants, Contracts & other External Sources	$0	$0	$0	$0	$0
4.	Other Sources	$14,370	$15,125	$16,312	$17,094	$19,530
	Total (add 1-4)	**$132,180**	**$139,755**	**$154,187**	**$163,398**	**$178,826**

Cecil College expects that this program will be approximately the same size as the Arts and Sciences Transfer Option it is replacing, with modest growth.

We are projecting tuition increases of 2% each year. Other sources of revenue include Student Development fees ($8/credit) and Registration fees ($75/semester). On average, full-time Cecil students take 33 credits per year; part-time students take 20 credits per year on average.

TABLE 2: EXPENDITURES

	Expenditure Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1.	Faculty (b + c below)	$48,588	$49,380	$50,186	$51,006	$51,840
a.	# FTE	0.3	0.3	0.3	0.3	0.3
b.	Total Salary	$36,450	$36,997	$37,552	$38,115	$38,687
c.	Total Benefits	$12,138	$12,383	$12,634	$12,891	$13,153
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

[2] Assumes Cecil County resident taking 35 credits per year.
[3] Assumes Cecil County resident taking 20 credits per year.

6.	New or Renovated Space	$0	$0	$0	$0	$0
7.	Other Expenses	$0	$0	$0	$0	$0
	Total (Add 1-7)	**$48,588**	**$49,380**	**$50,186**	**$51,006**	**$51,840**

This program will be implemented with existing faculty resources and administrative staff, so there are no new expenses for personnel. Faculty FTE is calculated based on the total number of Computer Science students, as a proportion of students in all computer science-related programs, or .3 FTE.

Salaries are forecasted to increase 1.5% each year, while health benefits are forecasted to increase 2.5% each year. Library resources and equipment are budgeted within the general operating budget on an ongoing basis.

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

Faculty members are evaluated 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. In addition, faculty members are assessed in the classroom by the appropriate dean or designee each semester for their first year at Cecil College, annually for the next two years, and every three years thereafter. Student course evaluations are an important component in the College's process of monitoring student satisfaction.

All faculty members are contractually obligated to complete an annual report that includes assessment results. Faculty satisfaction is monitored through the Great Colleges to Work For Survey, which is administered every two years.

The College's Assessment Plan requires that each learning goal for an academic program be reviewed at least once every four years. These assessments are used to make improvements to the program. In addition, the College has an established Comprehensive Program Review process through which programs evaluate their strengths, opportunities, and cost effectiveness every eight years.

Student retention rates are regularly monitored by the division dean.

N. 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 embraces the value of diversity, and strives to continuously foster inclusiveness, and has identified "Graduates will illustrate knowledge of …the Diversity of Human Cultures" as one of the institution's six General Education learning goals.

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

This program is not related to low productivity programs identified by the Commission.

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

Cecil College is a member of NC-SARA and follows C-RAC guidelines for distance education.