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December 17, 2018

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

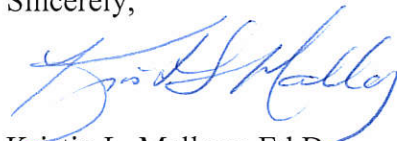
Dear Dr. Fielder:

Please accept this letter requesting the approval of the Associate of Science in STEM and related Areas of Concentrations including Biology, Chemistry, Chemistry: Pre-Pharmacy, Engineering, Math, and Physics. These changes have been recommended through the college curriculum committee and approved by the president and Board of Trustees.

Please contact me should you have any questions and/or need further information. A check has been mailed with a hard copy of the letter and coversheets; full reports have been sent electronically.

Thank you for your time and consideration.

Sincerely,



Kristin L. Mallory, Ed.D.
Vice President for Academic Affairs

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Cover Sheet for In-State Institutions

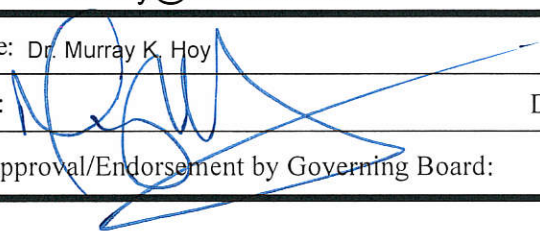
New Program or Substantial Modification to Existing Program

Institution Submitting Proposal	Wor-Wic Community College
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Each action below requires a separate proposal and cover sheet.

- | | |
|---|---|
| <input checked="" type="radio"/> New Academic Program | <input type="radio"/> Substantial Change to a Degree Program |
| <input type="radio"/> New Area of Concentration | <input type="radio"/> Substantial Change to an Area of Concentration |
| <input type="radio"/> New Degree Level Approval | <input type="radio"/> Substantial Change to a Certificate Program |
| <input type="radio"/> New Stand-Alone Certificate | <input type="radio"/> Cooperative Degree Program |
| <input type="radio"/> Off Campus Program | <input type="radio"/> Offer Program at Regional Higher Education Center |

Payment Submitted: <input checked="" type="radio"/> Yes	Payment Type: <input type="radio"/> R*STARS	Date Submitted: 12/17/2018
<input type="radio"/> No	<input checked="" type="radio"/> Check	

Department Proposing Program	Math and Science	
Degree Level and Degree Type	Associate of Science	
Title of Proposed Program	STEM	
Total Number of Credits	60	
Suggested Codes	HEGIS: 490200	CIP: 419999
Program Modality	<input type="radio"/> On-campus <input type="radio"/> Distance Education (<i>fully online</i>) <input checked="" type="radio"/> Both	
Program Resources	<input type="radio"/> Using Existing Resources <input checked="" type="radio"/> Requiring New Resources	
Projected Implementation Date	<input checked="" type="radio"/> Fall <input type="radio"/> Spring <input type="radio"/> Summer Year: 2019	
Provide Link to Most Recent Academic Catalog	URL: https://www.worwic.edu/Programs-Courses/College-Catalog	
Preferred Contact for this Proposal	Name: Dr. Kristin L. Mallory	
	Title: Vice President for Academic Affairs	
	Phone: (410) 334-2813	
	Email: kmallory@worwic.edu	
President/Chief Executive	Type Name: Dr. Murray K. Hoy	
	Signature: 	Date: 12/14/2018
	Date of Approval/Endorsement by Governing Board: 12/13/2018	

Revised 6/13/18

Associate of Science in STEM- Wor-Wic Community College

A. Centrality to Institutional Mission Statement and Planning Priorities

The mission of Wor-Wic Community College is to offer “high quality, affordable educational offerings”. Wor-Wic Community College proposes offering an Associate of Science (A.S.) degree in Science, Technology, Engineering, and Mathematics (STEM) with areas of concentration in Biology, Chemistry, Chemistry: Pre-pharmacy, Engineering, Mathematics and Physics. The degree and six areas of concentration are designed to prepare graduates to transfer to four-year colleges and universities to pursue a degree in a STEM discipline in support of careers in biological sciences, chemistry, mathematics, statistics, physics, engineering, pharmacy, medicine, veterinary, dentistry, and mortuary science. While attending Wor-Wic Community College, students will complete foundational coursework in their general education courses as well as a broad selection of STEM-specific courses.

The proposed program and areas of concentration directly support our vision to “be a leader in enhancing the quality of life on the Lower Eastern Shore by developing a world-class workforce and providing excellence in education and training”. Further, a 2016-2021 strategic priority for our campus is to “increase student success by delivering relevant courses and programs”.

These proposed programs build on an already existing Biology transfer degree and may be offered without the addition of new full-time faculty and using our current physical facilities (see section L). Therefore, the program is reliably sustainable using current budgetary support.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan:

The Maryland Higher Education Commission, in the 2017-2021 Maryland State Plan, identified, as a major goal, to “foster innovation in all aspects of Maryland higher education to improve access and student success” by developing partnerships that support “workforce development and improve workforce readiness”.¹ The workforce data (next section) reveals a need to grow the pool of available STEM workers for local, state, and national employers.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and the State:

Occupations in Science, Technology, Engineering and Mathematics (STEM) are some of the fastest growing and most highly compensated professions. Consider the following facts from the U.S. Bureau of Labor Statistics 2017 report on STEM occupations:

- There were nearly 8.6 million STEM jobs, representing 6.2 % of U.S. employment, in May 2015.
- The national average wage for all STEM occupations was \$87,570, which is nearly double the national average wage for non-STEM occupations (\$45,700).
- Employment in STEM fields grew by 10.5% between May 2009 and May 2015, representing 817,260 new jobs.

¹ Maryland Higher Education Commission. (2017). Maryland State Plan for Postsecondary Education: 2017-2021. Retrieved from <http://www.mhec.state.md.us/About/Pages/2017StatePlanforPostsecondaryEducation.aspx>.

- The STEM group that is projected to add the most new jobs from 2014 to 2024 are those in mathematical science occupations (28.2% growth compared to 6.5% for all occupations), followed by STEM-related postsecondary teachers and computer occupations.
- Over 99% of STEM employment is in occupations that require postsecondary education compared to 36% of overall occupations.²

The salary projections for STEM degrees are further supported by the National Association of Colleges and Employers (NACE). In the Winter 2018 Salary Survey, students earning degrees in engineering, computer science, and math and science degrees were the most highly compensated graduates at the bachelor’s-degree level. These graduates were also in high demand among employers that participated in the Job Outlook 2018 survey. The average salary for the Mid-Atlantic Region (all occupations) for graduates with Bachelor’s Degrees was \$54,549 with STEM graduates earning higher than average salaries (Engineering \$66,458, Math \$62,527, and Physics \$55,416).³

In the state of Maryland, the Department of Labor, Licensing, and Regulation has projected long-term positive growth (2016-2026) in STEM occupations including Mathematicians (+5.2%), Engineers (+5.0%) and Life Scientists (+5.9% includes biochemists, biophysicists, biologists, physicists, and chemists).⁴

A nine county query of the Delmarva region using Economic Modeling Specialists International (EMSI) indicates current and future career prospects in STEM occupations are positive⁵.

Occupation	2017 Jobs	2021 Jobs	% Change
Math/Statisticians	30	34	+12%
Engineering Occupations*	550	589	+7%
Engineering Technicians	145	150	+3%
Biochemists/Biophysicists	23	27	+17%
Microbiologists, Zoologists, Wildlife Biologists, Biological Scientists	131	138	+5%
Astronomers, Physicists, Atmospheric and Space Scientists	154	162	+5%

*includes Aerospace, Biomedical, Chemical, Environmental, Health & Safety, Industrial, Marine, Petroleum

D. Reasonableness of Program Duplication

Only Frederick Community College, in mid-Western Maryland, offers an Associate of Science in STEM. Chesapeake Community College, in the upper Eastern Shore, offers an Associate of Science in Biological Sciences. Maryland Schools that offer Bachelor of Science degrees (STEM-related) in the college coverage area and in the larger regional area of the Delmarva Peninsula include Salisbury University and the University of Maryland Eastern Shore. The proposed degree would allow local students the opportunity to start at their local community college and transfer to a four-year institution within our regional area or, more broadly, outside our geographic area.

² U.S. Bureau of Labor Statistics. (2017, January). STEM Occupations: Past, Present, and Future. Retrieved from <http://www.naceweb.org/research/reports/>.

³ National Association of Colleges and Employers. (2018, Winter). Salary Survey: Executive summary. Retrieved from <http://www.naceweb.org/research/reports/>.

⁴ Department of Labor, Licensing, and Regulation. (2016). Maryland Occupational Projections: Workforce information and performance. Retrieved from <https://www.dlir.state.md.us/lmi/iandoproj/maryland.shtml>.

⁵ Economic Modeling Specialists International. (October, 2018). Retrieved from <https://www.economicmodeling.com/company/>

Data from the Maryland Higher Education Commission Enrollment report support the viability of these programs at neighboring four-year institutions.⁶

Institution	Degree Level	Program Name	CIP	Enrollment
Frederick Community College	Associate of Science	STEM	419999	213
Chesapeake Community College	Associate of Science	Biological Sciences	260101	25
Salisbury University	Bachelor of Science	Biology	260101	541
	Bachelor of Science	Chemistry	400501	122
	Bachelor of Science	Math	270101	109
	Bachelor of Science	Physics	400801	114
University of MD Eastern Shore	Bachelor of Science	Biology	260101	303
	Bachelor of Science	Chemistry	400501	26
	Bachelor of Science	Engineering	140101	161
	Bachelor of Science	Math	270101	26
	Bachelor of Science	Physics	NA	NA

E. Relevance to High-Demand Programs at Historically Black Institutions (HBIs):

Students from Wor-Wic Community College will be able to transfer to the University of Maryland Eastern Shore to complete a Bachelor of Science in a STEM concentration based on the coursework that they have completed.

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

Once the program has been approved, Wor-Wic will seek articulation agreements with the University of Maryland Eastern Shore to allow students to transfer with a preferred and advanced standing status.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes:

G.1. Establishment of Proposed Program and Faculty Who Will Oversee Program

The proposed program would take the place of the current Biology Transfer degree while also expanding the diversity of STEM offerings with six areas of concentration. Program oversight will be by Dr. Stacey Hall, Department Head for Mathematics and Science and Dr. Colleen Dallam, Dean of General Education.

G.2. Educational Objectives:

Graduates of the STEM program will be able to:

1. Demonstrate logical thinking skills and professional ethics to design, conduct and report the results of a scientific investigation that safely employs laboratory equipment using the scientific method;
2. Retrieve, interpret, evaluate and critically reflect upon progress in STEM disciplines using information from professional sources;
3. Accurately apply mathematics skills to formulate, solve, and interpret models that demonstrate mathematical and scientific concepts;

⁶ Maryland Higher Education Commission: Trends in Enrollment by Program 2004-2017. (April, 2018). Retrieved from https://data.mhec.state.md.us/mac_Trend.asp.

4. Identify and apply fundamental core content theories and concepts in biological and physical sciences.

G.3. Assessment and Documentation of Student Achievement

Student achievement and learning outcomes performance at Wor-Wic Community College are documented via the institution's planning and assessment software Nuventive Improve. Consistent with college policy and assessment procedures, the STEM degree with Areas of Concentration will be evaluated annually from program level and course level review processes. Program effectiveness data including final exam pass rates, student retention and student completion are specific measures evaluated from a program perspective. Multiple means of assessment will be utilized and benchmarks established on a program and course level basis. Appropriate action plans and strategies will be created and implemented by course coordinators and department heads when benchmarks are partially met or not met.

G.4. Course list including title, credit hours, course descriptions and program requirements:

**Associate of Science STEM
(Proposed Pattern)**

First Year

<u>Summer II</u>		<u>Credit Hours</u>
SDV 100	Fundamentals of College Study	1
 <u>Fall</u>		
*ENG 101	Fundamentals of English I	3
*MTH 121 or 122	Precalculus I or Precalculus II	3-4
GEN ED	Biological/Physical Science Elective (CHM 101, BIO 105, PHY 121 Recommended)	4
Elective	General Elective	<u>3</u>
		13-14
 <u>Spring</u>		
*ENG 151	Fundamentals of English II (Arts & Hum Req't)	3
*GEN ED	Biological/Physical Science Elective (CHM 101, BIO 105, PHY 121 Recommended)	4
Elective	STEM Elective***	4
Elective	General Elective	<u>3</u>
		14

Second Year

<u>Fall</u>		
Elective	STEM Elective***	3
Elective	STEM Elective***	4
Elective	General Elective	3
GEN ED	Social/Behavioral Science Requirement	3
GEN ED	Arts and Humanities Requirement (COM 101, COM 200, or COM 201 Recommended)	<u>3</u>
		16
 <u>Spring</u>		
Elective	STEM Elective***	3
Elective	STEM Elective***	4
Elective	General Elective	3
Elective	General Elective	3
GEN ED	Social/Behavioral Science Requirement****	<u>3</u>
		16

*This course has a prerequisite.

**Some STEM Areas of Concentration require more advanced mathematics courses.

*** Take a minimum of 18 credits of STEM electives from any of the courses listed below. A minimum of 6 credits in the same discipline and at the 200 level is required. Any BIO (105 and higher), CHM, CMP (104 and higher), IDS200H, MTH (122 and higher), PHY (121 and higher) course meets this requirement. Students are encouraged to meet with an advisor and consult ARTSYS to ensure transferability.

**Associate of Science STEM
Biology (Area of Concentration)
(Proposed Pattern)**

First Year

<u>Summer II</u>		<u>Credit Hours</u>
SDV 100	Fundamentals of College Study	1

Fall

*ENG 101	Fundamentals of English I	3
*MTH 121	Precalculus I	3
*CHM 101	General Chemistry I	4
*BIO 105	Principles of Biology I	<u>4</u>
		14

Spring

*ENG 151	Fundamentals of English II (Arts & Hum Req't)	3
*CHM 102	General Chemistry II	4
*BIO 106	Principles of Biology II	4
GEN ED	Social/Behavioral Science Elective	3
Elective	General Elective	<u>3</u>
		17

Second Year

Fall

*CHM 201	Organic Chemistry I	4
*PHY 121	Physics I	4
*Elective	Biology Elective (BIO 202, BIO 203, BIO 220, BIO 221)	4
GEN ED	Arts and Humanities Requirement	<u>3</u>
		15

Spring

*CHM 202	Organic Chemistry II	4
*Elective	Science Elective (PHY 122, BIO 202, BIO 203, BIO 220, BIO 221)	4
Elective	General Elective	3
GEN ED	Social/Behavioral Science Requirement	<u>3</u>
		14

*This course has a prerequisite

**Associate of Science STEM
Chemistry (Area of Concentration)
(Proposed Pattern)**

First Year

<u>Summer II</u>		<u>Credit Hours</u>
SDV 100	Fundamentals of College Study	1

Fall

*ENG 101	Fundamentals of English I	3
*MTH 122	Precalculus II	4
*CHM 101	General Chemistry I	4
*BIO 105	Principles of Biology I	<u>4</u>
		15

Spring

*ENG 151	Fundamentals of English II (Arts & Hum Req't)	3
*CHM 102	General Chemistry II	4
*MTH 201	Calculus I	4
GEN ED	Social/Behavioral Science Requirement	<u>3</u>
		14

Second Year

Fall

*CHM 201	Organic Chemistry I	4
*CHM 107	Laboratory Safety	1
*PHY 141	Principles of Physics I	4
GEN ED	Arts and Humanities Requirement	3
Elective	General Elective	<u>3</u>
		15

Spring

*CHM 202	Organic Chemistry II	4
*MTH 202	Calculus II	4
*PHY 142	Principles of Physics II	4
GEN ED	Social/Behavioral Science Requirement	<u>3</u>
		15

*This course has a prerequisite.

**Associate of Science STEM
Chemistry: Pre-Pharmacy (Area of Concentration)
(Proposed Pattern)**

First Year

<u>Summer II</u>		<u>Credit Hours</u>
SDV 100	Fundamentals of College Study	1

Fall

*ENG 101	Fundamentals of English I	3
*MTH 201	Calculus I	4
*CHM 101	General Chemistry I	4
*BIO 105	Principles of Biology I	<u>4</u>
		15

Spring

*ENG 151	Fundamentals of English II (Arts & Hum Req't)	3
*MTH 202	Calculus II	4
*CHM 102	General Chemistry II	4
GEN ED	Arts and Humanities Requirement	<u>3</u>
		14

Second Year

Fall

*CHM 201	Organic Chemistry I	4
*CHM 107	Laboratory Safety	1
*PHY 121 or PHY 141	Physics I or Principles of Physics I	4
*BIO 202	Anatomy & Physiology I	4
GEN ED	Social/Behavioral Science Requirement	<u>3</u>
		16

Spring

*CHM 202	Organic Chemistry II	4
GEN ED	Social/Behavioral Science Requirement	3
*PHY 122 or PHY 142	Physics II or Principles of Physics II	4
*BIO 203	Anatomy & Physiology II	<u>4</u>
		15

*This course has a prerequisite.

**Associate of Science Degree
Engineering (Area of Concentration)
(Proposed Pattern)**

First Year

<u>Summer II</u>		<u>Credit Hours</u>
SDV 100	Fundamentals of College Study	1

Fall

*ENG 101	Fundamentals of English I	3
*MTH 122	Precalculus II	4
*CHM 101	General Chemistry I	4
*EGR 101	Introduction to Engineering Design	<u>3</u>
		14

Spring

*ENG 151	Fundamentals of English II (Arts & Hum Req't)	3
*CMP 104	Introduction to Programming	4
*MTH 201	Calculus I	4
GEN ED	Social/Behavioral Science Requirement	3
Elective	General Elective	<u>3</u>
		17

Second Year

Fall

*MTH 202	Calculus II	4
*PHY 141	Principles of Physics I	4
*CMP 210	Programming Structures and Applications	4
GEN ED	Arts and Humanities Elective	<u>3</u>
		15

Spring

*MTH 205	Differential Equations	4
*MTH 203	Calculus III	4
*PHY 142	Principles of Physics II	4
GEN ED	Social/Behavioral Science Requirement	<u>3</u>
		15

*This course has a prerequisite.

**Associate of Science STEM
Math (Area of Concentration)
(Proposed Pattern)**

First Year

<u>Summer II</u>		<u>Credit Hours</u>
SDV 100	Fundamentals of College Study	1

<u>Fall</u>		
*ENG 101	Fundamentals of English I	3
*MTH 122	Precalculus II	4
CMP 104	Introduction to Programming	4
Elective	General Elective	<u>3</u>
		14

<u>Spring</u>		
*ENG 151	Fundamentals of English II (Arts & Hum Req't)	3
*MTH 201	Calculus I	4
*MTH 152	Elementary Statistics	3
GEN ED	Social/Behavioral Science Requirement	3
Elective	General Elective	<u>3</u>
		16

Second Year

<u>Fall</u>		
*MTH 202	Calculus II	4
*PHY 141	Principles of Physics I	4
*ECO 201	Principles of Microeconomics	3
<i>or</i>		
*CMP 210	Programming Structures and Applications	4
GEN ED	Arts and Humanities Requirement	<u>3</u>
		15-16

<u>Spring</u>		
*MTH 205	Differential Equations	4
*MTH 203	Calculus III	4
*PHY 142	Principles of Physics II	4
GEN ED	Social/Behavioral Science Requirement	<u>3</u>
		15

*This course has a prerequisite.

**Associate of Science STEM
Physics (Area of Concentration)
(Proposed Pattern)**

First Year

<u>Summer II</u>		<u>Credit Hours</u>
SDV 100	Fundamentals of College Study	1

<u>Fall</u>		
*ENG 101	Fundamentals of English I	3
*MTH 122	Precalculus II	4
*CHM 101	General Chemistry I	4
Elective	General Elective	<u>3</u>
		14

<u>Spring</u>		
*ENG 151	Fundamentals of English II (Arts & Hum Req't)	3
*CHM 102	General Chemistry II	4
*MTH 201	Calculus I	4
Elective	General Elective	<u>3</u>
		14

Second Year

<u>Fall</u>		
*MTH 202	Calculus II	4
*PHY 141	Principles of Physics I	4
*CMP 104	Introduction to Programming	4
GEN ED	Social/Behavioral Science Requirement	3
GEN ED	Arts and Humanities Requirement	<u>3</u>
		18

<u>Spring</u>		
*MTH 205	Differential Equations	4
*MTH 203	Calculus III	4
*PHY 142	Principles of Physics II	4
GEN ED	Social/Behavioral Science Requirement	<u>3</u>
		15

*This course has a prerequisite.

NEW STEM Courses to support STEM program and six areas of concentration:

BIO 105 Principles of Biology I (4 credits) <Course Replaces Existing Course BIO 210>

This course, which is intended for science majors, offers an introduction to the basic biological principles common to all living organisms. Topics include basic cell structure, cellular biochemistry and energy conversion, molecular biology and cellular signaling. *Hours: 39 lecture hours and 26 laboratory hours. Prerequisite: MTH 092 with a grade of "C" or better or acceptable mathematics diagnostic scores or permission of the department head. Laboratory fee: \$30. Usually offered in the fall.*

BIO 106 Principles of Biology II (4 credits)

This course is a continuation of BIO 105. Topics include mechanisms of evolution, biological diversity and the classification of life, and population and community ecology. *Hours: 39 lecture hours and 26 laboratory hours. Prerequisite: BIO 105 with a grade of "C" or better or permission of the department head. Laboratory fee: \$30. Usually offered in the spring.*

CHM 107 Laboratory Safety (1 credit)

This course serves to develop the skills needed for students to work with chemicals in a confident and responsible way. Emphasis is placed on safety precautions and emergency procedures used in case of a chemical accident. *Hours: 15 lecture. Prerequisite: CHM 102. Corequisite: CPR Certification. Usually offered in the fall.*

EGR 101 Introduction to Engineering Design (3 credits)

This course provides an overview and application of the basic tools and techniques of engineering design, including computer-aided design (CAD), data collection and analysis, engineering reports, spreadsheets and use of software tools. *Hours: 26 lecture and 26 laboratory. Prerequisite: MTH 121 or acceptable placement test scores. Usually offered in the fall.*

MTH 121 Precalculus I (3 credits) <Course Replaces Existing Course MTH 154>

This course covers the advanced algebra necessary to prepare students for the study of calculus. Topics include solving, graphing and modeling with linear, quadratic, polynomial, rational, radical, exponential, logarithmic equations and inequalities. Basic conic sections, matrices, and linear programming topics are also included. *Hours: 39 lecture. Prerequisites: MTH 099 with a grade of "C" or better, or acceptable mathematics placement scores. Usually offered fall and spring.*

MTH 122 Precalculus II (4 credits)

This course is a continuation of MTH 121. Trigonometry and advanced algebra are studied to prepare students for calculus. Trigonometric topics include angle measurement, definitions of the six trigonometric functions from the right triangle and unit circle perspectives, graphs, identities, inverses and equations. Algebraic topics include polar coordinates, parametric equations and a review of functions and graphs. A problem solving approach utilizes applications and a graphing calculator throughout the course. *Hours: 52 lecture. Prerequisites: MTH 121 with a grade of "C" or better or acceptable mathematics placement test score.*

MTH 203 Calculus III (4 credits)

This course is designed to provide the student with a study of vectors in a plane, three-dimensional space, introduction to hyperspace, partial differentiation, multiple integration, and topics in vector calculus to include Green's Theorem, Stoke's Theorem, and the divergence theorem. Knowledge of a computer algebra system,

such as Mathematica, is expanded. *Hours: 52 lecture. Prerequisites: MTH 202 with a grade of "C" or better or permission of the department head. Usually offered in the spring.*

MTH 205 Differential Equations (4 credits)

This course introduces the basic techniques for solving first and second order differential equations, both linear and nonlinear, and systems of differential equations. Applications of differential equation in various situations will be covered. The use of a mathematical software system is an integral part of the course. *Hours: 52 lecture. Prerequisites: MTH 202 with a grade of "C" or better or permission of the department head. Usually offered in the spring.*

PHY 141 Principles of Physics I (4 credits)

This is the first part of a two-semester calculus-based general physics course designed to give students a general knowledge of principles of mechanics, conservation laws, gravitation, simple harmonic motion, fluids and heat. *Hours: 39 lecture and 26 laboratory. Prerequisite: MTH 122 with a grade of "C" or better and corequisite MTH 201 with a grade of "C" or better or permission of department head. Laboratory fee: \$30. Usually offered in the fall.*

PHY 142 Principles of Physics II (4 credits)

This is the second part of a two-semester calculus based course designed to give students a general knowledge of electricity and magnetism, electromagnetic waves, DC and AC circuit analysis, optics and modern physics. *Hours: 39 lecture and 26 laboratory. Prerequisite: PHY 141 and MTH 201 with a grade of "C" or better or permission of the department head. Laboratory fee: \$30. Usually offered in the spring.*

Existing STEM Courses (Support degree requirements and STEM electives)

BIO 115 Introduction to Human Structure and Function (3 credits)

This course provides an overview of the structure and function of the various systems of the human body. Emphasis is placed on how the structure of body organs and tissues complement their functions. The relationship between body systems is explored, as is their contribution to the functioning of the body as a complete unit. *Hours: 39 lecture. Usually offered in the fall and spring.*

BIO 120 Nutrition (3 credits)

The biochemical and physiological aspects of the science of nutrition are explored. Basic principles of normal nutrition and the relationship of nutrition and health throughout the life cycle are studied. This course also covers therapeutic nutrition to meet the needs of individuals who require changes in dietary intake because of disease, stress, trauma, metabolic alterations or allergies. *Hours: 39 lecture. Usually offered in the fall, spring and summer.*

BIO 202 Anatomy and Physiology I (4 credits)

This course offers an introduction to the structure and function of the human body, including cellular biology and histology. Systematic study involves homeostatic mechanisms of the integumentary, skeletal, muscular and nervous systems, including special senses. Laboratory study encompasses gross and microscopic anatomy of these systems, with dissection and selected experiments in physiology. *Hours: 39 lecture and 26 laboratory. Prerequisite: An acceptable biology placement test score or BIO 099 (can be taken concurrently with BIO 202). Laboratory fee: \$30. Usually offered in the fall, spring and summer.*

BIO 203 Anatomy and Physiology II (4 credits)

This course is a continuation of BIO 202. The cardiovascular, respiratory, digestive, urinary and reproductive systems are studied. Endocrine relationships and homeostasis are stressed. Laboratory study involves gross and microscopic anatomy of these systems, with selected experiments in physiology. Hours: 39 lecture and 26 laboratory. Prerequisite: BIO 202 with a grade of "C" or better. Laboratory fee: \$30. Usually offered in the fall, spring and summer.

BIO 220 Microbiology (4 credits)

This course offers an introduction to the biology of microorganisms with emphasis on bacteria. General principles of microbial classification, morphology, physiology and genetics are covered, including the role of microorganisms in natural and disease processes of man. Current trends and topics are discussed. Laboratory study includes the basic use of the microscope and aseptic techniques in the observation, isolation, identification and control of selected bacteria. Hours: 39 lecture and 39 laboratory. Prerequisite: BIO 101, BIO 202 or BIO 210 with a grade of "C" or better or permission of the department head. Laboratory fee: \$55. Usually offered in the fall, spring and summer.

BIO 221 Zoology (4 credits)

This course, which is intended for science majors, offers an introduction to the study of biodiversity, structure and function of animals and animal-like protists, with an emphasis on evolutionary relationships. Hours: 52 lecture and 26 laboratory. Prerequisite: BIO 210 with a grade of "C" or better or permission of the department head. Laboratory fee: \$30. Usually offered in the spring.

CHM 101 General Chemistry I (4 credits)

This course examines the fundamental laws of chemistry and atomic structure, with an emphasis on chemical calculations and quantitative relationships. Hours: 39 lecture and 39 laboratory. Prerequisite: MTH 099, an acceptable mathematics placement test score or permission of the department head. Laboratory fee: \$30. Usually offered in the fall and spring.

CHM 102 General Chemistry II (4 credits)

This course is a continuation of CHM 101, including chemical equilibrium, electrochemistry and organic chemistry. Hours: 39 lecture and 39 laboratory. Prerequisite: CHM 101 with a grade of "C" or better or permission of the department head. Laboratory fee: \$30. Usually offered in the spring and summer.

CHM 201 Organic Chemistry I (4 credits)

This course involves the systematic study of the compounds of carbon, including their organization, preparation and typical reactions. Classes of compounds studied include aliphatic and aromatic hydrocarbons, alcohols, ethers, and epoxides. Hours: 39 lecture and 39 laboratory. Prerequisite: CHM 102 with a grade of "C" or better or permission of the department head. Laboratory fee: \$30. Usually offered in the fall and spring.

CHM 202 Organic Chemistry II (4 credits)

This course is a continuation of CHM 201 and the study of carbon compounds, such as aldehydes, ketones, carboxylic acids and other carbonyl compounds. The focus is on the mechanism and stereochemistry of organic reactions. Mass spectrometry and infrared and nuclear magnetic resonance spectroscopy are also explored in the identification of these compounds. Hours: 39 lecture and 39 laboratory. Prerequisite: CHM 201 with a grade of "C" or better or permission of the department head. Laboratory fee: \$30. Usually offered in the spring.

CMP 104 Introduction to Programming (4 credits)

This course introduces students to the basic principles of programming, object-oriented concepts and terminology. Using an industry-appropriate and current programming language, students are introduced to the concepts of decision, repetition, objects, classes, inheritance and polymorphism with an easy-to-use and entertaining programming language. Hours: 26 lecture and 26 laboratory. Laboratory fee: \$25. Usually offered in the fall and spring.

CMP 107 Windows Operations (2 credits)

This course focuses on the use of the Microsoft Windows operating system in an enterprise environment. An in-depth analysis of the operating system is conducted, including system images, basic networking, security and troubleshooting. Reading and analytical skills needed by computer support technicians are emphasized in this course. Hours: 26 lecture and 26 laboratory. Laboratory fee: \$25. Usually offered in the fall and spring.

CMP 115 Fundamentals of Computer Architecture (3 credits)

This course covers the basic organization and design of computers. Topics include the organization and function of central processing units (CPUs), memory, bus structures, input/output devices, operating systems, application software and networks. Hours: 26 lecture and 26 laboratory. Laboratory fee: \$25. Usually offered in the fall and spring.

CMP 120 Operating Systems (2 credits)

This course introduces single-board computing that students use to design and develop practical “Internet of Things” (IoT) devices for machine-to-machine (M2M) communications while learning programming and computer hardware. The focus is on the administration, configuration, use and maintenance of a Linux- and mobile-based operating system. Hours: 13 lecture and 39 laboratory. Prerequisite: CMP 104. Laboratory fee: \$25. Usually offered in the spring.

CMP 130 Introduction to Web Development (3 credits)

This course covers the principles of creating hypertext markup language (HTML) for webpages and the elements used to create them. Cascading style sheets (CSS) are introduced to add style to webpages and to create enhanced visual effects. Responsive formatting techniques are introduced to make the site adaptable. This course covers the fundamental elements needed to create webpages. Students design and build a website using current technology. Hours: 26 lecture and 26 laboratory. Laboratory fee: \$25. Usually offered in the fall and spring.

CMP 141 Introduction to Game Development (3 credits)

This course introduces students to the concepts of video game development. Students engage in the creative process of video game development with a focus on quality outputs. Topics covered include the history of game development, mechanics, genres, processes and quality. This course also covers the workflow of developing a video game from beginning to end. Hours: 26 lecture and 26 laboratory. Laboratory fee: \$25. Usually offered in the fall.

CMP 142 Game Engines I (3 credits)

This course introduces the process of developing games utilizing existing game development platforms. A current industry-standard development platform is used for various game development tasks. Students examine the creation of design documents and the development of prototypes. Key concepts such as game play, game mechanics and game engine programming are addressed. Hours: 26 lecture and 26 laboratory. Prerequisite: CMP 141 or permission of the department head. Laboratory fee: \$25. Usually offered in the spring.

CMP 150 Introduction to Networking (3 credits)

This course provides a background to networks and how they are used. This course covers how local area networks (LANs) are managed, the types of LANs available today and the software that LANs use. Students are also introduced to the concepts of wide area networks. Hours: 26 lecture and 26 laboratory. Prerequisite: CMP 115 or permission of the department head. Laboratory fee: \$25. Usually offered in the spring.

CMP 210 Programming Structures and Applications (4 credits)

This course offers an introduction to the theory of programming structures and problem analysis to solve common computer problems. Problem-solving applications are developed using an object-oriented programming language. Hours: 26 lecture and 52 laboratory. Prerequisites: CMP 104. Laboratory fee: \$25. Usually offered in the fall.

CMP 215 Website Design and Development (4 credits)

This course builds on CMP 130 to further expand student skills in hypertext markup language (HTML) and cascading style sheets (CSS). Students are also introduced to web scripting for website enhancements, a current content management system (CMS) for managing content, and developing and customizing a website. Image editing for the web is used for creating graphics for websites. Hours: 26 lecture and 52 laboratory. Prerequisites: CMP 104 and CMP 130, or permission of the department head. Laboratory fee: \$25. Usually offered in the fall.

CMP 225 Data Communications and Networking (4 credits)

This course covers the operations of computer networks and network operating systems. Documentation and network best practices are emphasized. This course provides students with hands-on experience in accessing computer networks. Hours: 26 lecture and 52 laboratory. Prerequisite: CMP 150 or permission of the department head. Laboratory fee: \$25. Usually offered in the fall.

CMP 230 Advanced Web Solutions (4 credits)

This course covers advanced topics in web development. Custom website functionality, such as plugins and/or widgets, is covered. Using a web-based programming language and database concepts, students create web applications that increase website functionality and satisfy business requirements. Hours: 26 lecture and 52 laboratory. Prerequisite: CMP 215. Laboratory fee: \$25. Usually offered in the spring.

CMP 241 Game Engines II (4 credits)

This course builds on the topics covered in CMP 142. Students continue utilizing existing game development platforms to perform more advanced tasks. Students examine the creation of design documents and the development of playable prototypes. Key concepts such as game world development, game character development, level development and level balancing are addressed. Hours: 26 lecture and 52 laboratory. Prerequisite: CMP 142 or permission of the department head. Laboratory fee: \$25. Usually offered in the fall.

CMP 245 Computer and Network Security (3 credits)

This course covers the principles of computer system security, with a focus on network security. Topics include network attacks and defenses, application security (e.g., web, email and databases), viruses, social engineering attacks, privacy, digital rights management, authentication methods, access control, cryptography, public key infrastructure, identifying attacks and vulnerabilities, and wireless network security. Students also learn about security procedures to protect data in computer environments, the effects of viruses and ethical issues raised by computer security in the business world. Hours: 26 lecture and 26 laboratory. Prerequisite: CMP 150 or permission of the department head. Laboratory fee: \$25. Usually offered in the fall.

CMP 246 Web-Based Management (3 credits)

This course provides an opportunity for students to examine social networks, social media and online advertising techniques for improving web presence. Students also explore technical and creative elements to create organic search engine optimization (SEO) to improve ranking, drive traffic and increase awareness in search engines. Students identify web-based marketing opportunities and recommend an appropriate web-based management strategy. Hours: 39 lecture. Prerequisite: CMP 130 or permission of the department head. Usually offered in the spring.

CMP 247 Advanced Topics in Information Technology (4 credits)

This course exposes students to advanced networking topics not covered in previous networking courses. Advanced topics covering the latest advances in networking and best practices are explored. Students work individually and in group settings on advanced networking projects to enhance their knowledge. Hours: 39 lecture and 26 laboratory. Prerequisite: CMP 225 or permission of the department head. Usually offered in the spring.

CMP 255 Database Design and Management (4 credits)

This course emphasizes database interaction with Structured Query Language (SQL) and MySQL, the fundamentals of programming with databases, application techniques and security -- skills that are the foundation to managing database-backed websites or any relational database application. Students gain practical experience in the laboratory through a database application language. Hours: 26 lecture and 52 laboratory. Prerequisites: CMP 104 and CMP 130 or permission of the department head. Laboratory fee: \$25. Usually offered in the fall.

IDS 200H Scientific Thought and Data Analysis, Honors (3 credits)

This course explores and applies the methods of modern science in the context of the cultural issues that define the present day workings and future of human beings. It focuses on modern science as a powerful and often controlling societal force, as seen through its influence in politics, business, health, industry and technology. The primary focus of this course is the seminar discussion of readings and theory. To support the connection between theory and practice, a portion of the course each week is devoted to experimentation and data analysis. This course is one of two core courses in the honors program and is required for honors program graduates. Hours: 39 lecture and 1 field trip. Prerequisites: Honors program eligibility and MTH 092 or an acceptable mathematics placement test score. Materials fee: \$40. Usually offered in the spring.

MTH 152 Elementary Statistics (3 credits)

This course introduces elementary statistics through a critical examination of its subjects and applications. Topics from descriptive statistics include data organization, expectation and measures of variation. Also covered are random variables, probability laws, counting techniques, binomial and normal distributions, applications of the central limit theorem, confidence intervals and tests of statistical hypotheses involving the mean, median and proportions. Topics from parametric and nonparametric statistics are introduced. Hours: 39 lecture. Prerequisites: ENG 095 or ENG 097 and MTH 092 with grades of "C" or better or acceptable reading and mathematics placement test scores. Usually offered in the fall, spring and summer.

MTH 160 Applied Calculus (3 credits)

This course focuses on the applications of calculus in the management, social, biological and technological sciences. Topics include a review of algebra and functions, limits, the derivative, techniques of differentiation and integrals. Single variable derivatives and integrals are applied in the context of the student's major course and field work. Regression analysis is applied throughout the course to model relations and functions for the

application of calculus techniques. Hours: 39 lecture. Prerequisite: MTH 121 with grades of “C” or better or an acceptable mathematics placement test score. Usually offered in the fall and spring.

MTH 201 Calculus I (4 credits)

This course focuses on the rigorous treatment of topics traditionally covered in a first-semester calculus course including the theory of limits, differentiation, applications of the derivative, antidifferentiation, the indefinite and definite integral, integration by substitution and applications of the integral. Particular emphasis is placed on the epsilon-delta definition of limit, the mean value theorem and Newton’s method. Students gain experience constructing mathematical and simulation models. Hours: 52 lecture. Prerequisite: MTH 154 with a grade of “C” or better or permission of the department head. Usually offered in the fall and spring.

MTH 202 Calculus II (4 credits)

This course on calculus with analytic geometry introduces integration techniques, improper integrals, sequences, infinite series, conic sections and polar coordinates. Students solve applied problems related to limits, differentiation, integration and infinite series. A computer algebra system, such as Mathematica or Matlab, is introduced and used. Hours: 52 lecture. Prerequisite: MTH 201 with a grade of “C” or better or permission of the department head. Usually offered in the spring.

PHY 121 General Physics I (4 credits)

This is the first part of a two-semester algebra-based course designed to give students a general knowledge of kinematics, Newton’s laws of motion, energy and momentum and their conservation, rotational motion, wave motion, temperature and heat. Hours: 39 lecture and 26 laboratory. Prerequisite: MTH 154 with a grade of “C” or better or permission of the department head. Laboratory fee: \$30. Usually offered in the fall and spring.

PHY 122 General Physics II (4 credits)

This is the second part of a two-semester algebra-based course designed to give students a general knowledge of electricity and magnetism, light and optics, and an introduction to the physics of the atom. Hours: 39 lecture and 26 laboratory. Prerequisite: PHY 121 with a grade of “C” or better or permission of the department head. Laboratory fee: \$30. Usually offered in the spring.

G.5. General Education Requirements

General Education Courses:

SDV 100 Fundamentals of College Study (1 credit)

This course is designed to introduce students to the information and habits that facilitate academic success at the college level. The course presents modules focusing on the expectations and realities of college responsibility; active learning and critical thinking skills; increasing motivation and decreasing stress; analyzing the syllabus, instructor and course; establishing a learning style; organizing and balancing family, work and school; improving study and note-taking skills, and test-taking strategies; advisement, registration and the college catalog; safety, student services and other administrative resources; rules, regulations and civility; and lifelong learning. Students who do not pass this course must take it again the following fall or spring term. Hours: 15 lecture. Usually offered in the fall, spring and summer.

ENG 101 Fundamentals of English I (3 credits-English Requirement)

This course is designed to help students develop their college-level writing skills with an emphasis on the writing process. This course includes an introduction to research skills. Students write summary assignments and a series of essays in various modes, culminating in an argumentative research paper. Students must earn a grade of "C" or better in this course in order to enroll in ENG 151. Hours: 39 lecture. Prerequisites: ENG 095 and ENG 096, or ENG 097, with grades of "C" or better, or acceptable reading and writing placement test scores. Usually offered in the fall, spring and summer.

ENG 151 Fundamentals of English II (3 credits-Arts and Humanities Requirement)

This course continues to help students develop their college-level writing skills. Students are introduced to the study of literature (prose, poetry, fiction and drama). Students integrate outside sources with their own ideas in written arguments. They also refine their research and documentation skills. Hours: 39 lecture. Prerequisite: ENG 101 with a grade of "C" or better. Usually offered in the fall, spring and summer.

Additional General Education Requirements:

Math Requirement:

STEM program: Choose from MTH 121 – Precalculus I (3 credits) or MTH 122 – Precalculus II (4 credits)

Biology Area of Concentration: MTH 121 – Precalculus I (3 credits)

Chemistry, Engineering, Math, Physics Areas of Concentration: MTH 122 – Precalculus II (4 credits)

Chemistry Pre-Pharmacy Areas of Concentration: MTH 201 – Calculus I (4 credits)

Biological/Physical Science Requirement

STEM Program: (8 credits) met through STEM electives. Following are recommended:

CHM 101 - General Chemistry I (4 credits)

BIO 105 – Principles of Biology I (4 credits)

PHY 121 – General Physics I (4 credits)

Biology, Chemistry, Chemistry Pre-Pharmacy, and Physics AOC: (8 credits)

BIO 105 – Principles of Biology 1 (4 credits)

CHM 101 – General Chemistry I (4 credits)

Engineering Area of Concentration: (8 credits)

CHM 101 – General Chemistry I (4 credits)

PHY 141 – Principles of Physics I (4 credits)

Math Area Of Concentration: (8 credits)

PHY 141 – Principles of Physics I (4 credits)

PHY 142 – Principles of Physics II (4 credits)

Social/Behavioral Science Requirement (6 credits): Choose from

ECO 151 – Principles of Macroeconomics (3 credits)

ECO 201 – Principles of Microeconomics (3 credits)

GEO 102 – Human Geography (3 credits)

HIS 101 – World Civilizations I (3 credits)

HIS 151 – World Civilizations II (3 credits)

HIS 201 – American History (3 credits)

POL 101 – American Government (3 credits)

PHY 101 – Introduction to Psychology (3 credits)
PSY 201 – Human Relations (3 credits)
SOC 101 – Introduction to Sociology (3 credits)

Arts and Humanities Requirement (6 credits):

ENG 151 – Fundamentals of English II (3 credits)

And 3 additional credits from:

ART 101 – Introduction to Art History (3 credits)
FRN 101 – Fundamentals of French I (3 credits)
FRN 102 – Fundamentals of French II (3 credits)
MUS 101 – Music Appreciation (3 credits)
PHL 101 – Introduction to Philosophy (3 credits)
COM 101 – Fundamentals of Oral Communication (3 credits)
COM 200 – Interpersonal Communication (3 credits)
COM 201 – Instructional Communication (3 credits)
SPN 101 – Fundamentals of Spanish I (3 credits)
SPN 102 – Fundamentals of Spanish II (3 credits)

General Electives

STEM program (18 credits): Choose any course to satisfy this requirement. Introductory, non-STEM major courses are excluded.

Biology, Math and Physics AOC (6 credits): Choose from any course to satisfy this requirement

Chemistry and Engineering AOC (3 credits): Choose from any course to satisfy this requirement.

Chemistry Pre-Pharmacy AOC (0 credits)

Biology Area of Concentration within the A.S. STEM

Concentration Courses:

BIO 106 – Principles of Biology II (4 credits)
CHM 102 – General Chemistry II (4 credits)
CHM 201 – Organic Chemistry I (4 credits)
CHM 202 – Organic Chemistry II (4 credits)
PHY 121 – Physics I (4 credits)
Biology Elective (4 credits) choose from
 BIO 202 – Anatomy & Physiology I (4 credits)
 BIO 203 – Anatomy & Physiology II (4 credits)
 BIO 220 – Microbiology (4 credits)
 BIO 221 – Zoology (4 credits)
Science Elective (4 credits) choose from
 PHY 122 – Physics II (4 credits)
 BIO 202 – Anatomy & Physiology I (4 credits)
 BIO 203 – Anatomy & Physiology II (4 credits)
 BIO 220 – Microbiology (4 credits)
 BIO 221 – Zoology (4 credits)

Chemistry Area of Concentration

Concentration Courses:

- CHM 102 – General Chemistry II (3 credits)
- CHM 107 – Laboratory Safety (1 credit)
- CHM 201 – Organic Chemistry I (4 credits)
- CHM 202 – Organic Chemistry II (4 credits)
- MTH 201 – Calculus I (4 credits)
- MTH 202 – Calculus II (4 credits)
- PHY 141 – Principles of Physics I (4 credits)
- PHY 142 – Principles of Physics II (4 credits)

Chemistry Pre-Pharmacy Area of Concentration

Concentration Courses:

- CHM 102 – General Chemistry II (3 credits)
- CHM 107 – Laboratory Safety (1 credit)
- CHM 201 – Organic Chemistry I (4 credits)
- CHM 202 – Organic Chemistry II (4 credits)
- BIO 202 – Anatomy & Physiology I (4 credits)
- BIO 203 – Anatomy & Physiology II (4 credits)
- MTH 202 – Calculus II (4 credits)
- PHY 121 or 141 – Physics I or Principles of Physics I (4 credits)
- PHY 122 or 142 – Physics II or Principles of Physics II (4 credits)

Engineering Area of Concentration

Concentration Courses:

- EGR 101 – Introduction to Engineering Design (3 credits)
- MTH 201 – Calculus I (4 credits)
- MTH 202 – Calculus II (4 credits)
- MTH 203- Calculus III (4 credits)
- MTH 205 – Differential Equations (4 credits)
- CMP 104 – Introduction to Programming (4 credits)
- CMP 210 – Programming Structures and Applications (4 credits)
- PHY 142 – Principles of Physics II (4 credits)

Math Area of Concentration

Concentration Courses:

- MTH 152 – Elementary Statistics (3 credits)
- MTH 201 – Calculus I (4 credits)
- MTH 202 – Calculus II (4 credits)
- MTH 203- Calculus III (4 credits)
- MTH 205 – Differential Equations (4 credits)
- CMP 104 – Introduction to Programming (4 credits)
- ECO 201 – Principles of Microeconomics (3 credits)
or CMP 210 – Programming Structures and Applications (4 credits)

Physics Area of Concentration

Concentration Courses:

- PHY 142 – Principles of Physics II (4 credits)
- CHM 102 – General Chemistry II (4 credits)
- CMP 104 – Introduction to Programming (4 credits)
- MTH 201 – Calculus I (4 credits)
- MTH 202 – Calculus II (4 credits)
- MTH 203- Calculus III (4 credits)
- MTH 205 – Differential Equations (4 credits)

G.6. Specialized Accreditation

There are no specialized accreditation or graduate certificate requirements for this program.

H. Adequacy of Articulation

This program has been designed to articulate with four-year postsecondary institutions. Each area of concentration was designed in close collaboration with our nearest four-year partner, Salisbury University. The following department chairs have reviewed and indicated their support for the proposed programs and their transferability for the development of new articulation agreements.

Dr. Les Erickson	Chair, Biological Science
Dr. David Rieck	Chair, Chemistry (includes Pre-Pharmacy)
Dr. Mark Muller	Associate Dean and Outgoing Chair, Physics (includes Engineering)
Dr. Donald Spickler	Chair, Math and Computer Science

The proposed paths were designed with consideration of existing paths not only at Salisbury University but also at UMBC, UMES, Towson and UMD-College Park. Students will be advised to consult the specific requirements for the institution to which they wish to transfer.

I. Adequacy of Faculty Resources

The Mathematics and Science department already offers a Biology transfer degree and numerous STEM course to support various programs. There are fourteen full-time faculty in the department and part-time faculty are hired as needed. The Technology department has two full-time faculty who teach numerous computer studies courses that may be used in proposed program as STEM electives. The current staffing levels are considered sufficient to support the requested addition of a new program with six areas of concentration. No additional faculty resources are anticipated for this program.

Faculty Member	Terminal Degree and Field	Full or Part-time	Rank/Title	Courses Taught
Francis Arquiza-Eccles	M.A. Mathematics	Full-time	Associate Professor of Mathematics	MTH 152 – Elementary Statistics (3 credits), MTH 160 – Applied Calculus (3 credits)

Lauren Cross	M.S. Biology	Full-time	Science Laboratory Coordinator	BIO 120 – Nutrition (3 credits)
Heather Davis	Ph.D. Molecular and Cell Biology	Part-time	N/A	CHM 101 – General Chemistry I (4 credits)
Salah Elbashir	D.V.M.	Part-time	N/A	BIO 202 – Anatomy and Physiology I (4 credits), BIO 203 – Anatomy and Physiology II (4 credits), BIO 220 – Microbiology (4 credits)
Jeff Fears	M.S. Life Sciences	Part-time	N/A	BIO 202 – Anatomy and Physiology I (4 credits), BIO 203 – Anatomy and Physiology II (4 credits)
Burma Freeman	M.S. Chemistry	Full-time	Assistant Professor of Physical Science	CHM 101 – General Chemistry I (4 credits), CHM 102 – General Chemistry II (4 credits), CHM 107 – Laboratory Safety (1 credit), CHM 201 – Organic Chemistry I (4 credits), CHM 202 – Organic Chemistry II (4 credits)
Debbie Fries	M.Ed. in Education and Math Education	Full-time	Assistant Professor of Mathematics	MTH 121 – Precalculus I (3 credits)
Erika Gerhold	M.S. Mathematics	Part-time	N/A	MTH 152 – Elementary Statistics (3 credits)
Stacey Hall	Ph.D. Animal Sciences	Full-time	Associate Professor of Biological Science / Mathematics and Science Department Head	BIO 106 – Principles of Biology II (4 credits), BIO 120 – Nutrition (3 credits) BIO 115 – Human Structure and Function (3 credits) BIO 202 – Anatomy and Physiology I (4 credits), BIO 203 – Anatomy and Physiology II (4 credits)
Pam Jones	M.Ed. Math Education	Full-time	Associate Professor of Developmental Mathematics	MTH 152 – Elementary Statistics (3 credits)
Michael Kelley	B.S. Computer Science	Full-time	Instructor of Computer Studies	CMP 104 – Introduction to Programming (4 credits) CMP 120 – Operating Systems (2 credits) CMP 130 – Introduction to Web Development (3 credits) CMP 210 – Programming Structures and App (4 credits) CMP 215 – Website Design and Development (4 credits) CMP 230 – Advanced Web Solutions (4 credits) CMP 246 – Web-Based Management (3 credits)
Ganna Miller	M.S. Biology	Part-time	N/A	BIO 202 – Anatomy and Physiology I (4 credits)
Alketa Nina	M.S. Mathematics	Full-time	Associate Professor of Mathematics	MTH 122 – Precalculus II (4 credits), MTH 160 – Applied Calculus (3 credits), MTH 201 – Calculus I (4 credits), MTH 202 – Calculus II (4 credits), MTH 203 – Calculus III (4 credits), MTH 205 – Differential Equations (4 credits)

Curtis Satterfield	M.S. Information Systems	Full-time	Associate Professor of Computer Studies / Technology Department Head	CMP 107 – Windows Operation (2 credits) CMP 115 – Fund. of Computer Architecture (3 credits) CMP 141- Introduction to Game Development (3 credits) CMP 142 – Game Engines I (3 credits) CMP 225 – Data Communic and Networking (4 credits) CMP 241 – Game Engines II (4 credits) CMP 242 – Game Development Capstone (4 credits) CMP 245 – Computer Network and Security (3 credits) CMP 247 – Advanced Topics Information Tech (4 credits) CMP 255 – Database Design and Management (4 credits)
Upul Senaratne	Ph.D. Physics	Full-time	Assistant Professor of Physical Science	PHY 121 – General Physics I (4 credits), PHY 122 – General Physics II (4 credits), PHY 141 – Principles of Physics I (4 credits), PHY 142 – Principles of Physics II (4 credits)
Ed Taylor	Ed.D. Higher Education Leadership M.S. Marine Biology	Full-time	Professor of Biological Science	BIO 105 – Principles of Biology I (4 credits), BIO 202 – Anatomy and Physiology I (4 credits), BIO 203 – Anatomy and Physiology II (4 credits), BIO 221 – Zoology (4 credits)
Terry Thompson	M.S. Human Anatomy & Physiology Instruction M.S. Ethology	Full-time	Professor of Biological Science	BIO 202 – Anatomy and Physiology I (4 credits), BIO 203 – Anatomy and Physiology II (4 credits), IDS 200H – Scientific Thought and Data Analysis (3 credits)
Mary Lou Townsend	M.Ed. Math Education	Full-time	Assistant Professor of Mathematics	MTH 152 – Elementary Statistics (3 credits)
Heidi Walker	Ph.D. Biochemistry	Full-time	Assistant Professor of Biological Science	BIO 220 – Microbiology (4 credits), CHM 101 – General Chemistry I (4 credits), CHM 102 – General Chemistry II (4 credits), CHM 201 – Organic Chemistry I (4 credits),

J. Adequacy of Library Resources

STEM majors will have ready access to a supply of current and relevant books, journals, periodicals and other reference materials needed to meet the requirements of the curriculum. Wor-Wic uses an electronic library that supports the needs of its students. Multiple Media Centers, on campus, are staffed to provide research assistance. Web-delivered subscription databases cover academic disciplines, including STEM. Wor-Wic students also have privileges for the libraries at the University of Maryland Eastern Shore and Salisbury University.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Equipment

Our campus currently supports a Biology degree and a broad offering of STEM coursework that ensures adequate physical facilities, infrastructure, and instructional equipment to support the new STEM program and its areas of concentration. There are currently five teaching laboratories to support the science program: a Physical science laboratory, two Anatomy and Physiology laboratories, a Chemistry/Microbiology laboratory, and a Biology laboratory. Our mathematics program is supported by a multi-year software contract with Wolfram Mathematica and a Mathematics laboratory that provides math students access to computers and tutoring support. Each building on campus has a media center that provides students with access to computers and support staff.

L. Adequacy of Financial Resources with Documentation

This application of an Associate in Science in STEM includes multiple areas of concentration (e.g. Biology, Chemistry, Math, Physics, and Engineering). The coursework required can be offered using the leadership of our current full-time faculty and our current classroom and laboratory infrastructure. Some additional budgetary investment in Physics laboratory equipment would be needed for the more advanced Physics (Calculus-based) labs, but the college is sufficiently resourced to support some additional equipment as well as pay for an adjunct for an Introduction to Engineering Design course. The tables provided below show expected incremental resources and costs. The tables show only projected increases in student enrollment as well as one part time faculty needed to cover class offerings. Other needed resources including administrative support, space, supplies, etc. are currently available and show as not required. Additional equipment needed is estimated. Changes in projected time dependent variables are footnoted below the tables.

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)	19440	29160	39168	48960	59184
a. Number of F/T students	4	6	8	10	12
b. Annual tuition/fee rate	3240	3240	3264	3264	3288
c. Total F/T revenue (a * b)	12960	19440	26112	32640	39456
d. Number of P/T students	4	6	8	10	12
e. Credit hour rate	116	116	117	117	118
f. Annual credit hour	12	12	12	12	12
g. Total P/T revenue (d * e * f)	6480	9720	13056	16320	19728
3. Grants, Contracts & other external sources	0	0	0	0	0
4. Other Sources	0	0	0	0	0
TOTAL (Add 1 - 4)	19440	29160	39168	48960	59184

b. \$116/cr.hr. tuition and \$19/cr. Hr . fees @ 12 credit hours / student / year increased by \$1/cr. hr. tuition rate in years 3 and 5

e. \$116/cr.hr. tuition and \$19/cr. hr. fees @ 12 credit hours / student / year increased by \$1/cr. hr. tuition rate in years 3 and 5

TABLE 2: EXPENDITURES					
Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	2280	2280	2280	2280	2280
a. #FTE	0.20	0.20	0.20	0.20	0.20
b. Total salary	2280	2280	2280	2280	2280
c. Total benefits	0	0	0	0	0
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)	2280	2280	2280	2280	2280

1.a. Based on additional P/T faculty teaching 1 course (3 cr) per semester.

M. Adequacy of Provisions for Evaluation of Program

The college requires continual assessment of programs, courses, and faculty as set forth by their policies and procedures. Benchmarks are set on a program and course level basis. Courses are evaluated yearly to identify any learning objectives that are not being met. The standard benchmark for the school is 70% pass rate by objective on final exams. If a course is identified as failing to meet this benchmark on one or more objectives, appropriate corrective action is taken by the course coordinators and department heads. Action plans are created and updated at the six month and one-year marks to ensure the benchmarks have improved. This serves as both assessment of a course and student learning outcomes for the course.

Faculty participate in a yearly evaluation process to address any issues at both the personnel level and the teaching level. Faculty must submit both a plan of instruction, writing assignment, and personal narrative explaining their accomplishments over the prior year. Student opinion of learning survey data is incorporated into the faculty's evaluation. The scores are presented to the faculty department heads who send recommendations of contract renewal to the appropriate dean.

N. Consistency with the State's Minority Student Achievement Goals

Wor-Wic Community College maintains a cultural diversity plan, which states:

“Wor-Wic Community College is committed to a plan of cultural diversity that promotes inclusivity of diverse students and employees. The college has created a welcoming atmosphere on campus and has infused cultural diversity in all college programs, services and communications. The college has demonstrated this

commitment to cultural diversity through the vision, values, mission, and goals stated in the strategic plan. The strategic plan of the college is in alignment with the diversity goals of the Maryland State Plan for Higher Education, including implementation strategies and timelines for meeting the goals. The college adheres to the definition of cultural diversity as ***inclusion of those racial and ethnic groups and individuals that are or have been underrepresented in higher education*** [Education Article, Annotated Code of Maryland 11-406-(b) (1) (iii)].”

This plan identifies how cultural diversity and minority achievement is addressed in each of the vision, mission and values’ statements as well as long-term goals and strategic initiatives.

Additionally, each year Wor-Wic produces a cultural diversity report in compliance with the Maryland Higher Education Commission reporting requirements for college cultural diversity plans [Education Article, Annotated Code of Maryland 11-406-(b) (1) (iii)]. The report describes the set of initiatives and achievements accomplished in support of the diversity plan for each year.

O. Relationship to Low Productivity Programs Identified by the Commission:

N/A

P. Adequacy of Distance Education Programs

Individual courses for this program may be offered in different modalities, including online. While not currently a member of C-RAC, the College complies with each of the guidelines through appropriate policies and practices. Wor-Wic Community College is approved to offer distance education programs by Middle States Commission on Higher Education and has recently been approved by MHEC to provide distance education offerings in the State of Maryland.