



ANNE ARUNDEL COMMUNITY COLLEGE

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Dr. Dawn Lindsay

President

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October 4, 2017

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

Dear Dr. Fielder:

Anne Arundel Community College is requesting approval for the new Arts & Sciences Transfer-Earth Science area of concentration. Adding this Earth Science Area of Concentration (with its pre-existing courses), prepares students to transfer to a four-year institution in a wide range of majors in Oceanography, Geology, or Atmospheric Sciences. This program is consistent with the college's mission in that it will allow us to respond "to the needs of our diverse community by offering high quality, affordable, accessible, and innovative life-long learning opportunities."

All documentation is attached and the chart below reflects the program name.

I look forward to your positive response. Should you have any questions, please contact Dr. Alycia Marshall, Associate Vice President for Learning at aamarshall@aacc.edu or (410) 777-2776.

MHEC Title	Prog. ID	CIP ID	MHEC Fee
Arts and Sciences Transfer-Earth Science	491001	240101	
Total			250.00

Sincerely,

Dr. Dawn Lindsay
President

- cc: Michael Gavin, Ph.D., Vice President for President
 Alycia Marshall, Ph.D., Associate Vice President for Learning & Academic Affairs
 Nanci Beier, M.A., Registrar
 Lance Bowen, Ph.D., Dean, Science & Technology
 Richard Heath, Financial Aid

MARYLAND HIGHER EDUCATION COMMISSION
ACADEMIC PROGRAM PROPOSAL

PROPOSAL FOR:

- NEW INSTRUCTIONAL PROGRAM
 SUBSTANTIAL EXPANSION/MAJOR MODIFICATION
 COOPERATIVE DEGREE PROGRAM
 WITHIN EXISTING RESOURCES or REQUIRING NEW RESOURCES

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

Anne Arundel Community College
Institution Submitting Proposal

Fall 2018
Projected Implementation Date

Associate Degree

Arts & Sciences Transfer-Earth Science

Award to be Offered

Title of Proposed Program

4910-01

Suggested HEGIS Code

Suggested CIP Code

Physical Science

Department of Proposed Program

Dr. Kirsten Casey

Name of Department Head

Dr. Kirsten Casey

Contact Name

kacasey@aacc.edu

Contact E-Mail Address

410-777-2062

Contact Phone Number

Signature and Date

President/Chief Executive Approval

November 3, 2016

Date

Date Endorsed/Approved by Governing Board

A. Centrality to institutional mission statement and planning priorities:

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

AACC's Mission Statement: "With learning as its central mission, Anne Arundel Community College responds to the needs of our diverse community by offering high quality, affordable, accessible, and innovative life-long learning opportunities."

To help meet the above mission, AACC has developed a variety of high quality programs for students who wish to receive an Associate of Science Transfer degree, and then transfer to a four-year institution offering Bachelor of Science degrees in various professional disciplines. This degree is designed to allow students to choose an area of concentration such as Astronomy, Biology, Chemistry or Physics, while achieving their general education requirements. Adding this Earth Science Area of Concentration (with its pre-existing courses), prepares students to transfer to a four-year institution in a wide range of majors in Oceanography, Geology, or Atmospheric Sciences, and then to enter the geosciences workforce, which is growing at higher-than-average rates.

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

The college's strategic plan, *Engagement Matters: Pathways to Completion*, focuses on creating the ideal conditions to ensure that more students complete their educational goals and earn family sustaining wages. The college is pursuing this plan while adhering to the mission's central tenet of committing to academic excellence. That is the fundamental foundation upon which the work and continued reputation as a college of distinction is built.

The strategic plan is strongly rooted in national research and best practices and reflects the student journey through the key milestones of engagement, entry, progress and completion. This guided pathways approach aims to provide better structure through intentional programming and interventions that will help all students through each milestone. The overriding purpose of *Engagement Matters: Pathways to Completion* is to "increase completion by transforming the culture of the institution to ensure equity and that the college remains student-ready and committed to academic excellence". The three Engagement Matters goals are:

- **Goal 1: Engagement & Entry** - Increase connection and enrollment of all students through a college-wide emphasis on equity, student success and academic excellence.
- **Goal 2: Progress** - Increase progress of all students through a college-wide emphasis on equity, student success and academic excellence.
- **Goal 3: Completion** - Increase completion of all students through a college-wide emphasis on equity, student success and academic excellence.

Successful completion of the Earth Science Area of Concentration will connect students to a wide range of transfer degree opportunities.

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


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

- **The need for the advancement and evolution of knowledge;**

The Earth Science Area of Concentration helps prepare students for environmentally and economically important subjects such as geology, oceanography, and atmospheric sciences. All of these fields touch on many of society's most important challenges such as climate change, energy, meteorology, environmental stewardship, water and mineral resources, etc. and address real world problems.

- **Societal needs, including expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education;**

In 2012, the President's Council of Advisors on Science and Technology identified the need to expand the number of STEM majors, and stated that the fields were going to have to appeal to a more diverse student body if the numbers were to rise. Specifically, the report called on institutions to spend more time improving outreach and instruction in the foundational courses in the first two years. In subsequent years, Earth Sciences have been emphasized as a natural place to recruit more students into the STEM fields, as they are frequently taken as general education courses. Community colleges, with their greater diversity of students, offer an important opportunity for broadening participation in STEM. At AACC, the Earth Science Area of Concentration creates a clear pathway for students in foundational courses, furthering awareness of transfer degrees and the many excellent career opportunities available to geosciences graduates.

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

The Earth Science Area of Concentration responds directly to the call to increase STEM majors, as outlined in the Maryland State Plan for Postsecondary Education. In fact, increasing the number of STEM degrees is a significant issue for the state and one of the "recurring themes that appear throughout many of the goals in *Maryland Ready*" (p. 12). Further, Earth Science has been identified by national organizations, such as the National Science Foundation, as an important approach to expanding the STEM pipeline.
<https://www.nsf.gov/pubs/2017/nsf17574/nsf17574.htm>

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

The Bureau of Labor Statistics estimates that the geosciences workforce is growing nationally at higher than average rates (10% growth rate in jobs 2014-2024). Coupled with significant turnover from retirements, it is estimated that there will be a shortfall of 90,000 geoscientists nationally by the year 2024. The entry-level credential for this field is a Bachelor's Degree. <https://www.bls.gov/ooh/life-physical-and-social-science/geoscientists.htm>

The American Geosciences Institute indicates there are over 8,000 geoscience employees in Maryland (non-federal/self-employed) with an average median salary of \$80,800. This does not include the thousands of jobs in a myriad of Federal agencies in our region: NASA, NOAA, NSF, USEPA, etc. American Geosciences Institute: <https://www.americangeosciences.org/policy/factsheet/states>.

AACC has been contacted by both Towson University and University of Maryland's Atmospheric Science Department seeking to recruit AACC transfer students. Both schools report significant enrollment growth in the last 5 years, and are seeking additional students. AACC has worked with these colleges to ensure that the Earth Science Area of Concentration will seamlessly transfer.

- D. **Reasonableness of program duplication:**

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

The collection of pre-existing courses at AACC that make up the Earth Science Area of Concentration, such as General Oceanography, Fundamentals of Weather and Physical Geology, are already being taught at the college. The existence of the Earth Science Area of Concentration at AACC will help our students more readily find a pathway to transfer to a four-year institution in a wide range of majors. This is similar to existing Areas of Concentration at AACC: Astronomy, Biology, Chemistry, Environmental Science, Physics, and Plant Science. Similar programs in AACC's geographical area are presented in Table 1 below. Although similar programs are offered at other MD community colleges, no Earth Science Areas of Concentrations are present.

TABLE 1		
College	Earth Science Area of Concentration Offered?	Similar Programs
Baltimore City Community College	No	AS Transfer Degree with Science Concentration
Community College of Baltimore County		AS Transfer Degrees with Concentrations in Biology, Chemistry, Environmental Science, Meteorology, Oceanography, Physics, and Science
Howard Community College	No	AA Transfer Degrees in Environmental Science (with Geology courses), Life Science, Physical Science, and Plant Science
Montgomery College	No	AA General Studies Degree in STEM, A&S Transfer Degrees with Tracks in Chemistry & Biochemistry, Environmental Science & Policy, Life Science, Physics, and Science.
Prince George's Community College	No	AA General Studies Degrees with Biology & Chemistry Options, and AS in Environmental Studies

2. Provide justification for the proposed program.

This Area of Concentration will provide a clear pathway for students to enter a STEM field in areas of great national interest. The courses are not new to AACC, the only new aspect is making clearer to students the pathway in Earth Science.

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

This Area of Concentration is designed with the intent of future transfer. However, it does not appear that any of the HBCU's has majors in earth science, geology, atmospheric & ocean science or environmental science (Source: ARTSYS Major Lookup; www.artsys.usmd.edu). This area of concentration meets the science and basic needs for any transfer student attending an HBI in any major except a specific science major (which may have different science requirements, however it meets most science ones as well). Specific transfer paths could be in Engineering, Science, Health Science, etc.

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

Maryland HBCU's have programs in agriculture, biology, chemistry, environmental science and physics. (Source: ARTSYS Major Lookup; www.artsys.usmd.edu). AACCC serves a diverse student body with increasing numbers of minority and underrepresented students. This Area of Concentration may increase the participation of underrepresented students in STEM by providing a transfer pathway to HBIs in multiple science and STEM majors, contributing to increased diverse science and STEM majors at HBIs.

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

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

Earth Science - Arts and Sciences (A.S.) Program Requirements: Total Credit Hours: 60

General Education Requirements: 34-37 credits

English: 3-6 credits

ENG 111 - Composition and Introduction to Literature 1 3 credit hours AND

ENG 112 - Composition and Introduction to Literature 2 3 credit hours

OR

ENG 115 - Composition and Introduction to Literature 1 for Non-Native Speakers 3 credit hours AND

ENG 116 - Composition and Introduction to Literature 2 for Non-Native Speakers 3 credit hours

OR

ENG 121 - Composition and Literature 3 credit hours

*Successful completion of ENG 121 fully satisfies the college English composition general education requirements.

Arts and Humanities: 6 credits

Communications course 3 credit hours

Sophomore Literature course 3 credit hours

*These courses simultaneously satisfy the Arts and Humanities general education requirements and two of the Program Requirements for this degree.

Biological and Physical Sciences: 8 credits

CHE 111 - General Chemistry 1 4 credit hours

PHS 113 - Physical Geology 4 credit hours

Computer Technology, Interdisciplinary Studies or Mathematics: 4 credits

MAT 191 - Calculus and Analytic Geometry 1 4 credit hours

Health/Fitness/Wellness: 3 credits

See General Education Health/Fitness/Wellness Requirements for a list of approved courses.

Mathematics: 4 credits

MAT 192 - Calculus and Analytic Geometry 2 4 credit hours

Social and Behavioral Sciences: 6 credits

Social and Behavioral Sciences course (other than history) 3 credit hours AND

Students must choose one History course from the following:

HIS 111 - Ancient and Medieval Western Civilizations 3 credit hours

HIS 112 - Early Modern and Modern Western Civilizations 3 credit hours

HIS 211 - United States History through the Civil War 3 credit hours

HIS 212 - United States History Since the Civil War 3 credit hours

*The History course simultaneously satisfies one of the Social and Behavioral Sciences general education requirements and one of the Program Requirements for this degree.

Area of Concentration Requirements: 23-26 credits

PHS 109 - General Oceanography 3 credit hours

PHY 211 - General Physics 1 4 credit hours

PHY 212 - General Physics 2 4 credit hours

Electives 12-15 credit hours

Suggested electives include:

MAT 202 - Linear Algebra 4 credit hours

MAT 212 - Differential Equations 4 credit hours

PHS 119 - Fundamentals of Weather 4 credit hours

PHY 213 - General Physics 3 4 credit hours

**One of the electives must be chosen to satisfy the computer competency requirement. See General Education Computing Competency Requirement for a list of approved courses.*

Computer Competency Requirement

All students in associate degree programs must demonstrate competence in computing and information technology (a computer competency requirement). Students may satisfy the computer competency course requirement simultaneously as they satisfy the computer technology general education course or with an elective.

Diversity Requirement

All students in associate degree programs must satisfy the diversity requirement. In many cases, students may satisfy this requirement simultaneously as they satisfy a general education course requirement or with an elective.

List of courses with title, semester credit hours and course descriptions

ENG 111 - Composition and Introduction to Literature 1

3 credit hours - Three hours weekly; one term.

This course meets the English Composition General Education Requirement.

Learn single-paragraph and multi-paragraph writing. Gain substantial writing practice both in and out of class. Analyze short fiction and poetry.

Prerequisite(s): *Required scores on the SAT, ACT, or the college's placement test; or a grade of C or better in ENG 002 or ENG 003 and, if necessary, in RDG 028 or RDG 029 or RDG 040.*

ENG 112 - Composition and Introduction to Literature 2

3 credit hours - Three hours weekly; one term.

This course meets the English Composition General Education Requirement.

Continue study of multi-paragraph writing, stressing patterns of exposition and instruction in writing research papers. Gain substantial writing practice. Read novels and plays.

Prerequisite(s): *ENG 111.*

Note: *This course must be completed with a C or better to satisfy the English composition general education requirement for award of a degree.*

ENG 115 - Composition and Introduction to Literature 1 for Non-Native Speakers

3 credit hours - Three hours weekly; one term.

This course meets the English Composition General Education Requirement.

Learn single-paragraph and multi-paragraph writing. This course is for students whose native language is not English. It covers substantially the same material as ENG 111 with an added emphasis on the specific difficulties that non-native speakers have when analyzing and discussing literature and writing essays.

Prerequisite(s): *Required scores on the college's placement test or successful completion of ESL 387, ESL 396, ESL 398, and ESL 399.*

ENG 116 - Composition and Introduction to Literature 2 for Non-Native Speakers

3 credit hours - Three hours weekly; one term.

This course meets the English Composition General Education Requirement.

Learn more about multi-paragraph writing, with emphasis on patterns of exposition and writing research papers. This course is for students whose native language is not English. It covers substantially the same material as ENG 112 with an added focus on the specific difficulties that non-native speakers have when analyzing and discussing literature and writing essays.

Prerequisite(s): *ENG 115 or the equivalent or permission of the department chair.*

Note: *This course must be completed with a C or better to satisfy the English composition general education requirement for award of a degree.*

ENG 121 - Composition and Literature

3 credit hours - Three hours weekly; one term.

This course meets the English Composition General Education Requirement.

Learn multi-paragraph writing, including the research paper, with stress on clarity, logical development, and solid support. Analyze complete works of literature from a variety of genres in the context of the works' intellectual, social, and cultural backgrounds.

Prerequisite(s): *An appropriate score on the verbal part of the ACT or SAT or on the English and reading sections of the college's placement test.*

Crosslisted: *Also offered as ENG 121H; credit is not given for both ENG 121 and ENG 121H.*

CHE 111 - General Chemistry 1

4 credit hours - Three hours of lecture and three hours of laboratory weekly; one term.

This course meets the Biological and Physical Sciences General Education Requirement.

Study atomic theory and periodic relationships, chemical bonding, gases, liquids and solids, stoichiometry, kinetic-molecular theory, solutions, oxidation-reduction, reactions of molecules and ions and nuclear chemistry. Laboratory work includes basic techniques and principles as well as quantitative measurements by titration, calorimetry and stoichiometry. Lab fee \$40.

Prerequisite(s): *MAT 137 or MAT 145 (formerly MAT 141) with a grade of C or better or eligibility for MAT 151 and eligibility for ENG 111 or ENG 115 or ENG 121.*

Crosslisted: *Also offered as CHE 111H .*

Note: *Credit is not given for both CHE 111 and CHE 103 or CHE 111H and CHE 103 or CHE 115 .*

PHS 113 - Physical Geology

4 credit hours - Three hours of lecture and three hours of laboratory weekly; one term.

This course meets the Biological and Physical Sciences General Education Requirement.

An introduction to Earth as a dynamic system of interconnected processes. The unifying theme of plate tectonics is discussed and developed in context within the topics of minerals and rocks, volcanoes, geologic time, crustal deformation and mountain building, earthquakes, Earth's interior, evolution of ocean floors and continents, mass movement, streams and floods, groundwater and other surface processes. An optional field trip is available. Lab fee \$30.

Prerequisite(s): *Eligibility for ENG 111 or ENG 115 or ENG 121.*

MAT 191 - Calculus and Analytic Geometry 1

4 credit hours - Four hours weekly; one term.

This course meets the Mathematics General Education Requirement.

Learn to find limits, derivatives and integrals of functions. Apply these concepts to explicit, implicit, algebraic, trigonometric and transcendental functions, using derivatives to analyze graphs and to model real situations.

Prerequisite(s): *MAT 151 or MAT 146 or equivalent, or completion of three years of high school mathematics including trigonometry and achieving an appropriate score on the mathematics part of the ACT or SAT or the Mathematics Placement Test.*

Crosslisted: *Also offered as MAT 191H; credit is not given for both MAT 191 and MAT 191H.*

Note: *Credit is not given for both MAT 191 and MAT 122 or MAT 191 and MAT 230.*

MAT 192 - Calculus and Analytic Geometry 2

4 credit hours - Four hours weekly; one term.

This course meets the Mathematics General Education Requirement.

Learn numerical and analytical techniques for integration and apply these techniques to solve problems involving definite integrals. Other topics include solving separable differentiable equations, extending the concepts of calculus to polar and parametric forms, using Taylor polynomials to approximate functions, and determining the convergence or divergence of improper integrals, infinite sequences and infinite series.

Prerequisite(s): MAT 191 or equivalent.

Crosslisted: Also offered as MAT 192H; credit is not given for both MAT 192 and MAT 192H.

HIS 111 - Ancient and Medieval Western Civilizations

3 credit hours - Three hours weekly; one term.

This course meets the Arts & Humanities General Education Requirement. This course meets the Social and Behavioral Sciences General Education Requirement.

Explore societal changes and continuities in structure, thought, government, economics, war and culture through readings, critical thinking and writing, from antiquity through the Renaissance.

Prerequisite(s): Eligibility for ENG 111 or ENG 115 or ENG 121.

HIS 112 - Early Modern and Modern Western Civilizations

3 credit hours - Three hours weekly; one term.

This course meets the Arts & Humanities General Education Requirement. This course meets the Social and Behavioral Sciences General Education Requirement.

Explore societal changes and continuities in structure, thought, government, economics and culture through readings, critical thinking and writing from the Renaissance to the present.

Prerequisite(s): Eligibility for ENG 111 or ENG 115 or ENG 121.

Note: HIS 111 is not a prerequisite for this course.

HIS 211 - United States History through the Civil War

3 credit hours - Three hours weekly; one term.

This course meets the Social and Behavioral Sciences General Education Requirement.

Explore American politics, cultures, economics and the interaction of people of different classes, races and genders through reading, critical thinking and writing, from colonization through 1865.

Prerequisite(s): Eligibility for ENG 111 or ENG 115 or ENG 121.

Crosslisted: Also offered as HIS 211H; credit is not given for both HIS 211 and HIS 211H.

HIS 212 - United States History Since the Civil War

3 credit hours - Three hours weekly; one term.

This course meets the Social and Behavioral Sciences General Education Requirement.

Explore American politics, cultures, economics and the interaction of class, race and gender through reading, critical thinking and writing, from the Civil War to the present.

Prerequisite(s): Eligibility for ENG 111 or ENG 115 or ENG 121.

PHS 109 - General Oceanography

3 credit hours - Three hours weekly; one term.

This course meets the Biological and Physical Sciences General Education Requirement.

A multidisciplinary survey of physical, chemical, meteorological, biological and geological aspects of oceans. Where appropriate, examples of oceanographic phenomena in the Chesapeake Bay are considered. Topics include waves, currents, tides, chemistry of sea water, ecosystems and life in oceans and estuaries, plate tectonics, marine sediments and discussions of environmental trends and problems.

Prerequisite(s): Eligibility for ENG 111 or ENG 115 or ENG 121.

Note: This course does not satisfy the curricular requirements for a laboratory science course.

PHY 211 - General Physics 1

4 credit hours - Three hours of lecture and three hours of laboratory weekly; one term.

This course meets the Biological and Physical Sciences General Education Requirement.

A survey of fundamental concepts and methods of physics as a basis for further study in science and engineering. Emphasis is on classical principles and their application to mathematical analysis of physical problems. The first term includes topics in mechanics, fluids and sound. Lab fee \$40.

Prerequisite(s): Eligibility for ENG 111 or ENG 115 or ENG 121; MAT 191 or concurrent enrollment with permission of department chair.

Crosslisted: Also offered as PHY 211H; credit is not given for both PHY 211 and PHY 211H.

Note: Credit is not given for both PHY 111 and PHY 211.

PHY 212 - General Physics 2

4 credit hours - Three hours of lecture and three hours of laboratory weekly; one term.

This course meets the Biological and Physical Sciences General Education Requirement.

Continuation of PHY 211, with emphasis on theory, problems and practical applications in topics of heat, electricity and magnetism. Lab fee \$40.

Prerequisite(s): PHY 211 and MAT 192 or concurrent enrollment in MAT 192 with permission of department chair.

Crosslisted: Also offered as PHY 212H; credit is not given for both PHY 212 and PHY 212H.

MAT 202 - Linear Algebra

4 credit hours - Four hours weekly; one term.

This course meets the Mathematics General Education Requirement.

Study vector spaces and linear transformations on finite-dimensional vector spaces. Topics include linear systems, matrices, determinants, inner product spaces and eigenvalues.

Prerequisite(s): MAT 191 or MAT 191H or equivalent.

Crosslisted: Also offered as MAT 202H. Credit is not given for both MAT 202 and MAT 202H.

MAT 212 - Differential Equations

4 credit hours - Four hours weekly; one term.

Analyze and solve ordinary differential equations of various types: separable, exact, linear equations of all orders and systems of linear equations. Master techniques including integrating factors, undetermined coefficients, the Wronskian, variation of parameters, reduction of order, power series, Laplace transforms and numerical approximations. Solve systems of linear equations using operator methods, numerical approximations and matrix methods. Apply these techniques to various applications including trajectories, mixing, growth, decay, vibrating springs, electric circuits and resonance. Use a mathematical software system as an integral and substantial part of the course.

Prerequisite(s): MAT 192

Crosslisted: Also offered as MAT 212H; credit is not given for both MAT 212 and MAT 212H.

PHS 119 - Fundamentals of Weather

4 credit hours - Three hours of lecture and three hours of laboratory weekly; one term.

This course meets the Biological and Physical Sciences General Education Requirement.

Explore basic principles of atmospheric science and investigate types of interesting weather phenomena. Learn about atmospheric warming mechanisms, development of clouds, global and regional wind patterns and all categories of severe weather developments. Analyze and interpret weather maps, satellite images and atmospheric thermodynamic diagrams. Develop informed conclusions about Earth's weather and climate changes. Lab fee \$30.

Prerequisite(s): Eligibility for MAT 137 or MAT 145 or MAT 151 and ENG 111 or ENG 115 or ENG 121.

PHY 213 - General Physics 3

4 credit hours - Three hours of lecture and three hours of laboratory weekly; one term.

Continuation of PHY 212, with emphasis on optics, relativity, quantum mechanics, solid-state physics and nuclear physics. Lab fee \$40.

Prerequisite(s): PHY 212.

Prerequisite or Corequisite: Prerequisite (or corequisite with permission of department chair): MAT 201 or MAT 212.

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

This area of concentration is designed as a selection of courses to support the Arts & Sciences Transfer degree. The science department has adopted the following set of learning outcomes for all science areas of concentration.

- Analyze and solve problems by applying discipline appropriate quantitative tools, concepts, and methods.
- Investigate physical phenomena experimentally, using discipline specific tools and methodology. Demonstrate mastery of discipline specific lab safety rules.
- Apply knowledge of discipline specific fundamental concepts to explain experimental outcomes or real world phenomena.
- Collect, analyze, and interpret information based on scientific reasoning and discipline specific concepts.

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

See #1 above.

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

Not applicable.

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

Not applicable.

H. Adequacy of articulation

All AACC courses transfer to Maryland institutions based on the rules outlined in COMAR 13B.06 General Education and Transfer. In addition, the department is currently discussing memorandums of understanding with programs at Towson University and University of Maryland to assure seamless transfer. The department plans to contact other institutions in the state as this area of concentration gets established. All of the courses in this program are very common courses at most colleges and universities.

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

Name	Terminal Degree	Status	Courses
Dan Fernandez	MS., Meteorology & Physical Oceanography	Full Professor, FT	PHS 109, PHS 119
Anthony Santorelli	Ph.D., Atmospheric Science	Assistant Professor, FT	PHS 109, PHS 119
Kathryn Keough	MS., Geology	Assistant Professor, PT	PHS 113
Seth Miller	Ph.D., Ecology	Adjunct Professor	PHS 109
Claudia Walters	MS., Marine, Estuarine and Environmental Sciences	Adjunct Professor	PHS 109
Binyam Woldemichael	Ph.D, Geology	Adjunct Professor	PHS 109, PHS 113
Robert Evens	MS., Earth Systems Sciences	Adjunct Professor	PHS 119

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

The Andrew G. Truxal Library currently holds resources successfully supporting the sciences. Resources are constantly reviewed for current content and availability. Library staff were consulted during the program development phase and determined that resources are available for the students in this program.

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

This Area of Concentration utilizes existing courses to establish a clear transfer pathway for students. Thus, current laboratory spaces, equipment and computer technologies are adequate to support this programming.

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

TABLE 1 - RESOURCES					
Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2. Tuition/Fee Revenue (c + g below)	\$33,750.00	\$34,425.00	\$58,522.50	\$59,692.70	\$60,885.70
a. Number of F/T Students	5	5	5	5	5
b. Annual Tuition/Fee Rate	\$4,500.00	\$4,590.00	\$4,681.80	\$4,775.44	\$4,870.94
c. Total F/T Revenue (a x b)	\$22,500.00	\$22,950.00	\$23,409.00	\$23,877.20	\$24,354.70
d. Number of P/T Students	5	5	15	15	15
e. Credit Hour Rate	\$150.00	\$153.00	\$156.06	\$159.18	\$162.36
f. Annual Credit Hour Rate	15	15	15	15	15
g. Total P/T Revenue (d x e x f)	\$11,250.00	\$11,475.00	\$35,113.50	\$35,815.50	\$36,531
3. Grants, Contracts & Other External Sources	\$0	\$0	\$0	\$0	\$0
4. Other Sources	\$0	\$0	\$0	\$0	\$0
TOTAL (Add 1-4)	\$33,750.00	\$34,425.00	\$58,522.50	\$59,692.70	\$60,885.70

Financial Data – Resources

1. Reallocated Funds:

None

2. Tuition and Fee Revenue:

The number of students is estimated based upon the number of students enrolled in similar A&S Transfer Degree programs, with Areas of Concentration in the Sciences. Tuition & Fees are estimated to increase by 2% each year.

3. Grants and Contracts:

None

4. Other Sources:

None

5. Total Year

None

TABLE 2 - EXPENDITURES					
Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b+c below)	\$14,225.95	\$14,510.47	\$29,601.60	\$30,193.63	\$30,797.50
a. # FTE	0.50	0.50	1.00	1.00	1.00
b. Total Salary	\$13,215.00	\$13,479.30	\$27,498.00	\$28,047.96	\$28,608.92
c. Total Benefits	\$1,010.95	\$1,031.17	\$2,103.60	\$2,145.67	\$2,188.58
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)	\$14,225.95	\$14,510.47	\$29,601.60	\$30,193.63	\$30,797.50

Financial Data – Expenditures

1. Faculty Funds:

Students entering the program will take foundation courses already in place for the Area of Concentration. Salaries are estimated to increase by 2% each year.

2. Admin. Staff Funds:

None

- 3. **Supportive Staff Funds:**
None
- 4. **Equipment:**
Existing
- 5. **Library:**
None
- 6. **New or Renovated Spaces:**
None
- 7. **Other Expenses:**

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

Anne Arundel Community College has the Committee on Educational Policies and Curriculum (EPC), designed to evaluate the addition or modification of new programs, and deletion of existing programs. EPC makes recommendations to the Academic Forum/Council of the college since it is charged with evaluating existing and proposed curricula and courses so that they support educational objectives and policies, and comply with established requirements from accrediting and other approving agencies.

The college conducts regular evaluations of degree programs with respect to enrollment, curriculum relevancy, and outcomes assessment. All programs undergo a comprehensive review on a staggered 4-year cycle, using a Comprehensive Program Review Template that contains program data scored on a rubric. The template includes metrics in the areas of program continuation and completion, course success, headcount and program outcomes assessment. Also required is completion of a Program Review Narrative, which includes action items. The entire package is then reviewed in meetings that include the program chair/director, Instructional Data Specialist, Director of Learning Outcomes Assessment, Dean, Associate Vice President for Learning (AVPL), and the Vice President for Learning. The purpose of the program review meeting is to share program successes and address program needs. To ensure progress is being made on action items, the Office of the AVPL requires the Deans to complete two-year interim reports.


In addition, all full-time faculty are reviewed annually using the process described in the College Manual. In the science departments, all new adjunct faculty are reviewed in their first semester using the department's peer mentor process, and subsequently a minimum of every three years.

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).

Community colleges, with their greater diversity of students, offer an important opportunity for broadening participation in STEM. At AACC, the Earth Science Area of Concentration, which includes courses that are frequently taken as general education courses, provides opportunity to be intentional about raising awareness among all students of transfer degrees and the many excellent career opportunities available to geosciences graduates.

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

Not applicable.

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

Not applicable.