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

Institution Submitting Proposal	Notre Dame of Maryland University

Each action below requires a separate proposal and cover sheet.

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

Payment Submitted: ○ Yes ○ No	Payment Type: ○ R*STARS # ○ Check # **01*0416848**	Payment Amount: $850	Date Submitted: **7/3/25**

Department Proposing Program	School of Arts, Sciences, and Business	
Degree Level and Degree Type	Baccalaureate Certificate	
Title of Proposed Program	STEM Studies	
Total Number of Credits	21-22	
Suggested Codes	HEGIS: 4902.00	CIP: 30.0101
Program Modality	◉ On-campus ○ Distance Education (fully online) ○ Both	
Program Resources	◉ Using Existing Resources ○ Requiring New Resources	
Projected Implementation Date (must be 60 days from proposal submisison as per COMAR 13B.02.03.03)	○ Fall ◉ Spring ○ Summer	Year: **2026**
Provide Link to Most Recent Academic Catalog	URL: https://catalog.ndm.edu/undergraduate-catalog	
Preferred Contact for this Proposal	Name: Jonas Prida Title: Associate VP of Academic Affairs Phone: 410-532-5316 Email: jprida@ndm.edu	
President/Chief Executive	Type Name: Marylou Yam Signature: [signature] Date: 6/30/25	
	Date of Approval/Endorsement by Governing Board: (President Signature above)	

Revised 4/2025

A. Centrality to Institutional Mission 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.

Notre Dame of Maryland University (NDMU) proposes a new undergraduate Baccalaureate Certificate in STEM Studies. The program is housed within the School of Arts, Science and Business and is designed to prepare students, particularly non-science majors, with foundational knowledge and interdisciplinary skills in STEM fields. The certificate emphasizes the scientific method, foundational science knowledge, and science communication, with the goal of preparing students to collaborate effectively in scientifically oriented workplaces, including national laboratories. It also provides a critical opportunity to enable students to participate in a new partnership with the Pacific Northwest National Laboratory which seeks a pipeline of STEM-prepared risk managers from NDMU's extant Master of Science in Risk Management.

The **STEM Studies Certificate** aligns closely with NDMU's mission:

NDMU educates leaders to transform the world. Embracing the vision of the founders, the School Sisters of Notre Dame, the University promotes the advancement of women and provides a liberal arts education in the Catholic tradition.

Notre Dame challenges women and men to:

- strive for intellectual and professional excellence,
- build inclusive communities,
- engage in service to others, and
- promote social responsibility.

This program directly supports NDMU's mission by equipping students with interdisciplinary scientific competencies and fostering their ability to transform the world by contributing to the pressing needs of the 21st century, including workforce gaps in STEM-focused organizations.

Intellectual and Professional Excellence

The STEM Studies Certificate emphasizes foundational training in biology, chemistry, physics, cybersecurity, communication and scientific reasoning, alongside critical thinking and problem-solving skills. Students will be equipped to enter professional environments that require a blend of technical knowledge and STEM competencies, such as risk management positions within national laboratories and other government agencies.

This rigorous scientific preparation ensures students are ready for advanced graduate studies, such as NDMU's MS in Risk Management, or for careers that require them to engage with

scientific professionals in STEM-related settings. These objectives reflect NDMU's commitment to challenging students to achieve academic excellence and emerge as leaders in their fields.

Service and Social Responsibility

STEM fields are critical for addressing societal challenges such as climate change, public health, and national security. The certificate program prepares students to engage meaningfully with these challenges by building skills in scientific reasoning, communication, and collaboration across disciplines. By preparing students to address the scientific dimensions of contemporary issues, the program advances NDMU's dedication to promoting social responsibility.

Building Inclusive Communities

The STEM Studies Certificate strongly aligns with NDMU's mission to build inclusive communities. The program is particularly suited to attract non-traditional students, including women, minorities, and students from non-STEM backgrounds, fostering diversity in STEM education and workforce development. By preparing these students for careers in risk management and other scientific fields, the program offers a pathway to underrepresented populations, ensuring broader participation in areas critical to public safety and national innovation.

This focus on inclusivity and accessibility supports NDMU's broader mission of creating transformative educational experiences in a compassionate and inclusive environment.

Community Engagement

NDMU emphasizes active engagement with the community. The STEM Studies Certificate supports this goal through NDMU's partnership with the Pacific Northwest National Laboratory (PNNL). This evolving partnership provides students with internships, networking opportunities, and exposure to real-world applications of their STEM and major education. Such engagement prepares students to make meaningful contributions to the most pressing issues facing our local and global communities.

In essence, the **STEM Studies Certificate** at NDMU is a transformative program that equips students with foundational STEM skills, interdisciplinary competencies, and a commitment to social responsibility, fully embodying the University's mission of intellectual achievement, ethical leadership, and a commitment to social justice and a life of service.

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

The introduction of the Baccalaureate Certificate in STEM Studies at Notre Dame of Maryland University (NDMU) will strategically support the University's five core goals:

1. Advance Transformational Excellence

The STEM Studies Certificate embodies NDMU's commitment to providing a transformative educational experience. By offering foundational training in interdisciplinary STEM fields such as biology, chemistry, physics, and cybersecurity, the program fosters intellectual growth and equips students with skills to tackle the challenges of the 21st-century in scientific environments. Students will engage in experiential learning, critical thinking, the scientific method and science communication, enabling them to collaborate effectively in complex, interdisciplinary settings. These opportunities prepare students to succeed in advanced studies or professional roles, aligning with NDMU's goal of developing leaders who drive innovation and address global challenges.

2. Drive Institutional Growth

This program creates new enrollment opportunities by appealing to non-science majors seeking to enhance their career readiness in STEM-related fields. By providing a pathway to the MS in Risk Management or other advanced education opportunities, the certificate program is poised to attract a diverse range of students. These students will come from varying academic disciplines and backgrounds, contributing to NDMU's financial sustainability and broadening the University's academic portfolio. The program's focus on workforce development in partnership with organizations such as the Pacific Northwest National Laboratory (PNNL) enhances its strategic value.

3. Expand Visibility

The STEM Studies Certificate strengthens NDMU's visibility as a leader in innovative and interdisciplinary education. By addressing workforce needs in national laboratories and other STEM-oriented organizations, graduates of the program will represent the University in prestigious scientific and technological fields. Partnerships with organizations like PNNL and participation in internships and collaborative projects will position NDMU as a forward-thinking institution that actively contributes to regional and national scientific goals. This expanded reputation reinforces the University's standing as a center for academic excellence and innovation.

4. Enhance Culture of Innovation

STEM fields are inherently dynamic and demand continuous innovation in education and workforce preparation. The program cultivates this mindset by integrating interdisciplinary coursework, critical problem-solving skills, and emerging trends in science communication and risk analysis. By encouraging collaboration across disciplines, the program positions NDMU as a leader in creating adaptable, innovative and transdisciplinary curricula. The certificate reflects a forward-thinking approach to STEM education, supporting the University's strategic goal of fostering creativity and transformative problem-solving among students and faculty. The STEM certificate also prepares students for our MS in Risk Management and career opportunities with the system of national laboratories.

5. Enrich SSND Charism

The charism of the School Sisters of Notre Dame (SSND) emphasizes education for social justice, service to others, and community engagement. The STEM Studies Certificate aligns with this mission by preparing students to contribute to solving critical societal challenges, such as public health, environmental protection, and national security. The program's commitment to accessibility ensures that women and underrepresented groups can pursue education and careers in STEM, promoting equity and diversity in these fields. By addressing the scientific needs of underserved populations and fostering leadership with a commitment to the common good, the program exemplifies the SSND mission to "transform the world through education."

In these ways, the Baccalaureate Certificate in STEM Studies will be instrumental in helping NDMU achieve its strategic goals, advancing its mission of educational excellence, inclusivity, innovation, and service.

3. Provide a brief narrative of how the proposed program will be adequately funded for at least the first five years of program implementation. (Additional related information is required in section L.)

This proposal emphasizes high-quality interdisciplinary education and practical training in STEM fields as well as opportunities to participate in a unique partnership with the national laboratories. At NDMU, the STEM Studies Certificate will leverage existing courses and resources across the departments of Biology, Chemistry, Physics, and Communication Arts. All courses within the program are already part of the University's undergraduate offerings, ensuring that no additional courses need to be developed. Faculty members across these departments are already equipped to deliver the content, and their collective expertise ensures the program's success without immediate incremental staffing needs.

Because the certificate program utilizes current courses and faculty, the implementation costs are minimal. As student enrollment grows, the program will contribute additional revenue to the University without requiring significant initial investment. If enrollment meets projected growth targets, NDMU will evaluate the need for adjunct faculty or additional sections of courses to accommodate demand.

The financial model below assumes:

- **21-22 credit hours** required for certificate completion.
- **Initial enrollment of 5-10 students per year**, increasing to 15-20 students annually by the fifth year.
- **No additional resource allocation required initially**, as courses are part of the current curriculum.

The modest additional revenue generated by the program will contribute to the University's financial sustainability. The minimal costs and high potential for enrollment growth align with NDMU's strategic financial goals.

1. Provide a description of the institution's commitment to:

a) ongoing administrative, financial, and technical support of the proposed program

The STEM Studies Certificate program will be housed within the School of Arts Science and Business. Administrative oversight will be provided by the existing academic leadership structure, including department chairs, The Dean of the School and the Office of the Provost. This framework ensures that any concerns about the program can be addressed efficiently through regular communication channels between faculty, department heads, and the Provost's Council.

Financial support for the program is included in NDMU's strategic budgeting process. Given the program's low-cost structure, existing resources—such as classroom space, laboratories, and faculty—will suffice for the initial implementation and operation. As enrollment grows, the revenue generated by tuition will further offset any additional costs.

Technical support will be provided through NDMU's robust infrastructure. The University's Learning Management System (Canvas) includes 24/7 support for students and faculty, while all in-person classes will take place in existing facilities, such as the recently renovated Knott Hall. NDMU's Facilities Department will manage any mechanical or logistical needs related to the use of these spaces.

b) continuation of the program for a period of time sufficient to allow enrolled students to complete the program.

NDMU is committed to maintaining the STEM Studies Certificate program for a period sufficient to allow all enrolled students to complete the program. The fact that the certificate courses also serve existing majors guarantees its availability. Resources for administrative, faculty, and technical support are already available to ensure seamless implementation and operation.

Should unforeseen circumstances necessitate the discontinuation of the program, NDMU will ensure a comprehensive "teach-out" process. All necessary courses and support will remain available to enrolled students until they complete their certificate. Students will continue to receive the same level of instruction, financial aid, and academic support to which they are entitled. By embedding the STEM Studies Certificate into the existing undergraduate structure, the University ensures stability and long-term sustainability for the program while maintaining its commitment to student success.

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:

a) The need for the advancement and evolution of knowledge

b) Societal needs, including expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education

c) The need to strengthen and expand the capacity of historically black institutions to provide high quality and unique educational programs

The demand for the Baccalaureate Certificate in STEM Studies reflects the increasing need for interdisciplinary training in science, technology, engineering, and mathematics (STEM) and the national laboratories need for a continuous pipeline of risk managers. Notre Dame University of Maryland has entered into a partnership with the Pacific Northwest National Laboratory to provide them with a pipeline of risk managers now and into the future. NDMU's graduate program in risk management has been identified by the PNNL as an academic program that provides students with the knowledge and skills they will need to prepare them for successful careers as risk managers for the National Laboratories and the National Nuclear Safety Administration (NNSA).

One tactic in our strategy to provide PNNL with a pipeline of risk managers is to prepare undergraduates to succeed in applying to and completing our MS in Risk Management. PNNL will provide internships and other forms of support to help successful students in this program to transition into risk management careers with PNNL, the other National Laboratories and NNSA upon successful completion of the MS program. Undergraduates from any major are eligible to apply to the MS in Risk Management program. Non-science majors who matriculate in the risk program with the intention of seeking employment with the National Laboratories require rudimentary science knowledge and skills that will be provided by this certificate.

As Maryland continues to expand its role as a hub for scientific innovation and research, including partnerships with national laboratories and federal institutions, the workforce must include individuals with foundational STEM knowledge who can contribute to technologically advanced and scientifically informed decision-making processes.

The STEM Studies Certificate addresses the need for students to gain interdisciplinary scientific knowledge and competencies, particularly students from non-STEM backgrounds. This program emphasizes foundational science knowledge, the application of the scientific method, and the ability to communicate scientific concepts effectively. These skills are vital for addressing contemporary challenges such as environmental risk management, public health, and national security.

By preparing students to collaborate with scientists, engineers, and technologists, the program contributes to the advancement of knowledge in emerging fields and supports the evolving workforce needs of organizations like the national laboratories. Graduates of this program will

help Maryland remain competitive in national and global efforts to address critical scientific and technological challenges.

The STEM Studies Certificate expands educational opportunities for minority and educationally disadvantaged students, reflecting NDMU's commitment to equity and inclusion. Maryland's diverse population includes substantial representation from African American, Hispanic, and Asian communities, many of whom face barriers to accessing STEM education. By offering a program designed to support non-traditional students and those without prior science training, the certificate serves as a bridge to advanced education and career pathways in STEM fields.

Targeted recruitment, partnerships with organizations like PNNL, and mentorship opportunities will enhance the participation of underrepresented groups in STEM, addressing disparities in workforce representation. This inclusivity not only enriches the educational environment but also brings diverse perspectives to problem-solving in scientific fields, fostering innovation and societal progress.

While the program is not designed specifically for HBIs, its emphasis on diversity and inclusion aligns with Maryland's broader goal of strengthening pathways for underrepresented populations in higher education. By focusing on accessibility and providing foundational STEM training, the certificate complements efforts to expand opportunities for students from historically disadvantaged backgrounds, supporting a shared mission to foster equity and academic excellence.

Maryland's proximity to federal agencies, research institutions, and national laboratories presents a unique opportunity for graduates of the STEM Studies Certificate to enter high-demand fields. The program addresses workforce needs in risk management, scientific research, and interdisciplinary collaboration, providing non-science majors with the skills necessary to thrive in STEM-focused environments.

The program's focus on practical applications of science, critical thinking, and communication ensures graduates are prepared to contribute to public health, environmental protection, and national security. By equipping students with these skills, NDMU supports the state's commitment to fostering a competitive and innovative workforce while addressing societal challenges.

The program prioritizes equity by expanding access to underrepresented populations. Academic support, including tutoring and career counseling, helps ensure their success. By addressing the barriers faced by disadvantaged groups, the STEM Studies Certificate advances Maryland's efforts to promote diversity and inclusion in STEM education.

Furthermore, a diverse student body contributes to the development of more inclusive and effective solutions to societal challenges. Understanding the needs of various populations enhances the development of policies and technologies that benefit everyone, furthering the mission of equity and representation in science.

In conclusion, the Baccalaureate Certificate in STEM Studies is essential for meeting Maryland's workforce and societal needs. By expanding educational opportunities, fostering inclusion, and preparing students for STEM-focused careers, the program aligns with the state's strategic priorities. It supports NDMU's mission to educate leaders who are committed to social equity, innovation, and service, ultimately contributing to the state's economic growth and public welfare.

1. Provide evidence that the perceived need is consistent with the **Maryland State Plan for Postsecondary Education**.

The Baccalaureate Certificate in STEM Studies aligns with the goals and objectives outlined in the Maryland State Plan for Higher Education, particularly in the areas of **Access**, **Success**, and **Innovation**.

Access and Equity

The program provides non-science majors with equitable access to foundational STEM education, bridging the gap for students traditionally underrepresented in scientific fields. This aligns with Maryland's goal to ensure affordable, high-quality postsecondary education for all residents, including those from minority and educationally disadvantaged backgrounds. By fostering partnerships with organizations like PNNL and offering flexible program pathways, the certificate expands opportunities for students to pursue meaningful careers in STEM-focused industries.

Student Success and Workforce Development

The STEM Studies Certificate is designed to prepare students for success in both advanced education and professional environments. By focusing on interdisciplinary training, critical thinking, and problem-solving, the program equips students with the skills necessary to navigate the complexities of STEM careers. The certificate also enhances the academic readiness of students who wish to pursue NDMU's MS in Risk Management, creating a seamless transition from undergraduate to graduate studies.

Retention and completion strategies, including mentorship, internships, and academic support services, ensure that students can achieve their educational and career goals. These efforts directly contribute to the state's goal of increasing degree attainment and promoting lifelong learning. The program's focus on developing technical, analytical, and research skills aligns with Maryland's workforce development initiatives.

Innovation and Excellence in Education

The program fosters innovation by equipping students with the tools to address real-world challenges through interdisciplinary collaboration. By integrating science communication, the scientific method, and critical analysis into the curriculum, the certificate promotes a culture of

creativity and adaptability. Students are trained to apply their knowledge to pressing societal issues, such as environmental risk, public health, and technological advancement, aligning with Maryland's emphasis on innovation in higher education.

Alignment with Maryland's Economic Goals

The demand for risk managers, analysts, and STEM-informed professionals continues to grow in Maryland, particularly within federal and state agencies, national laboratories, and private industries. The STEM Studies Certificate directly addresses these workforce needs by preparing students for interdisciplinary roles that require scientific literacy, analytical thinking, and effective communication.

Maryland's life sciences sector, bolstered by institutions like the National Institutes of Health (NIH) and the National Nuclear Security Administration (NNSA), requires professionals capable of bridging technical expertise with strategic management. The certificate ensures that graduates are prepared to fill these critical roles, particularly in partnerships like that with PNNL, which has identified an ongoing need for risk managers trained in STEM disciplines.

Furthermore, by targeting non-science majors, the program expands the pool of candidates ready to enter STEM-focused roles, addressing the state's need for a diverse and adaptable workforce.

The program supports Maryland's commitment to addressing disparities in education and workforce representation. By creating accessible pathways to STEM careers, the certificate empowers students from diverse backgrounds to contribute to fields that drive societal progress. This commitment enhances the state's ability to reduce inequities, promote economic mobility, and build a more inclusive and representative workforce.

In summary, the Baccalaureate Certificate in STEM Studies meets critical regional and statewide needs by expanding access to STEM education, addressing workforce shortages, and promoting equity and innovation. The program aligns seamlessly with Maryland's strategic priorities, positioning NDMU as a key contributor to the state's educational and economic goals.

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

1. Describe potential industry or industries, employment opportunities, and expected level of entry (*ex: mid-level management*) for graduates of the proposed program.

Graduates of the STEM Studies Certificate will be well-prepared for entry-level positions in industries that value foundational STEM knowledge and interdisciplinary skills. These roles include risk analysts, scientific communication specialists, STEM educators, and entry-level positions in environmental management, public health, and technology-oriented organizations.

Potential industries include:

- **Federal Agencies**: Positions at institutions such as the National Institutes of Health (NIH), National Nuclear Security Administration (NNSA), and other federal labs that require collaboration with STEM professionals.
- **Environmental Risk Management**: Opportunities in addressing environmental challenges, including roles in private companies and public organizations.
- **Public Health and Safety**: Supporting scientific research and outreach efforts in health and safety sectors.
- **Technology and Cybersecurity**: Supporting data management, risk assessment, and cybersecurity initiatives in technology-driven companies.

The U.S. Bureau of Labor Statistics (BLS) classifies risk managers under financial managers. Employment in this category is expected to grow by 17% from 2023 to 2033, which is much faster than the average for all occupations. This growth translates to approximately 75,100 job openings annually, accounting for both new positions and replacements due to retirements or career changes. The BLS provides data on various scientific occupations within the federal government. For instance, employment of environmental scientists and specialists is projected to grow by 7% from 2023 to 2033, faster than the average for all occupations. This growth equates to about 8,500 job openings each year.

While specific projections for all scientific roles in government are not detailed, the overall trend indicates a steady demand for scientists across various federal agencies. This demand is driven by the need for expertise in areas such as environmental protection, public health, and technological innovation.

2. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program.

The demand for professionals with interdisciplinary STEM skills is growing rapidly in Maryland, a hub for scientific innovation and federal research. Data from the U.S. Bureau of Labor Statistics highlights the increasing demand for individuals with foundational scientific literacy and risk management expertise. Key factors include:

- Maryland's proximity to federal institutions such as NIH, FDA, and national laboratories, which consistently seek professionals to support scientific collaboration.
- The state's robust STEM economy, particularly in research and development, environmental risk management, and technology sectors, aligns with the skills provided by the STEM Studies Certificate.

Projected job growth in related fields includes:

- Risk analysis, public health, and science communication: **11% growth from 2023 to 2033**.

- Supporting roles in STEM-related organizations: **9,000 annual openings in fields requiring foundational STEM knowledge**.
- The National Science Board reports, "according to Bureau of Labor Statistics (BLS) projections for 2022–32 (BLS 2022 Employment Projections), employment in science, technology, engineering, and mathematics (STEM) occupations is expected to grow faster than in non-STEM occupations (7% vs. 2%).

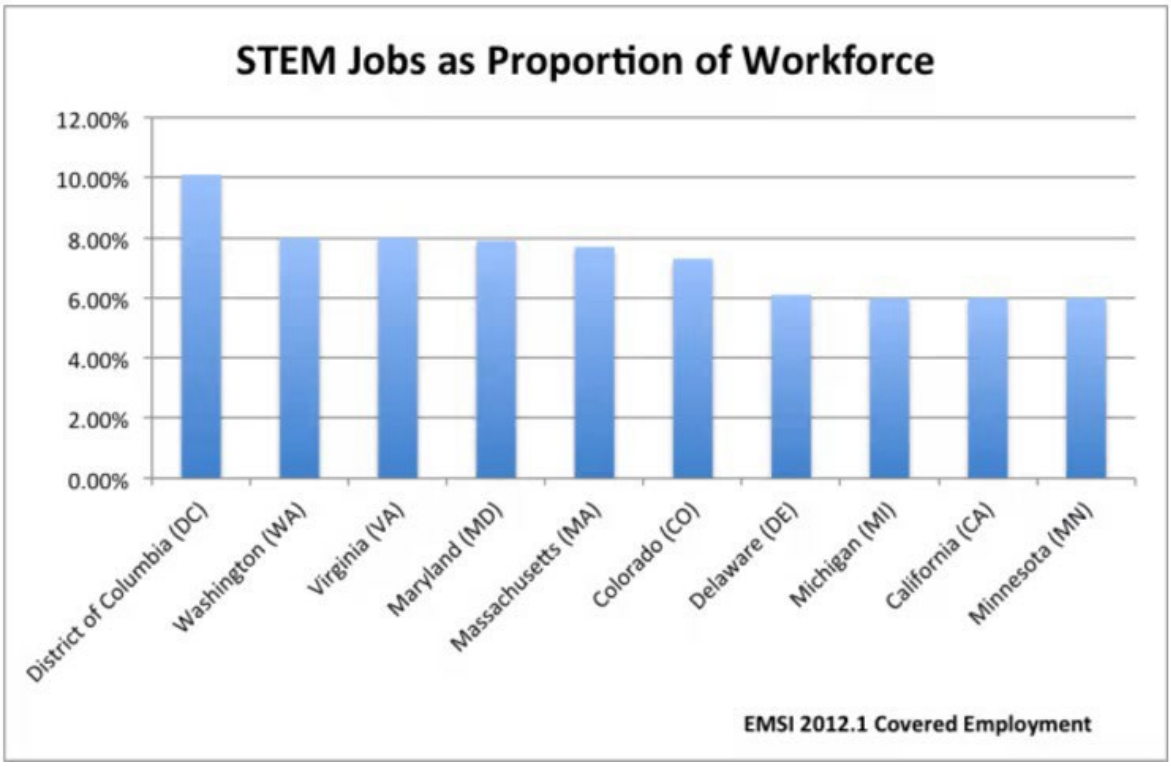
This data reflects the program's alignment with regional and national workforce needs, emphasizing its value in preparing students for high-demand roles in Maryland and beyond.

3. Discuss and provide evidence of market surveys that clearly provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.

According to the U.S. Bureau of Labor Statistics, employment in fields requiring foundational STEM skills is projected to grow by 7**% from 2022 to 2032**, outpacing the average for all occupations. Specifically, Maryland is positioned to benefit from increased demand in:

- Environmental risk management and public health sectors, supported by organizations like the Environmental Protection Agency (EPA).
- STEM outreach and education roles, particularly as Maryland continues to diversify its workforce and expand representation in science and technology fields.

The STEM Studies Certificate targets non-traditional students and those without prior STEM education, filling a unique niche in workforce preparation. By addressing training gaps and providing tailored academic support, the program ensures graduates are competitive in the job market.



Source: "The Number and Proportion of STEM Jobs by State"Published: June 19, 2012 Updated: November 2, 2022 Author: Emsi Burning Glass

4. Provide data showing the current and projected supply of prospective graduates.

While Maryland is home to strong graduate programs in STEM-related fields, there is a limited supply of undergraduate certificate programs that specifically prepare non-STEM majors for foundational roles in STEM industries. This program addresses this gap by offering an accessible pathway for students to build STEM skills, preparing them for further education or immediate workforce entry.

According to Emsi Burning Glass. "*The Number and Proportion of STEM Jobs by State*." Last modified November 2, 2022 the estimated regional demand and supply of STEM-related jobs are:

- **Demand**: Approximately 9,000 annual openings nationally in entry-level STEM-adjacent roles.
- **Supply**: Limited programs in Maryland focus on providing foundational STEM skills to non-science majors. Existing programs often cater exclusively to traditional STEM majors, creating an unmet need for accessible training.

By leveraging existing courses and faculty expertise, the STEM Studies Certificate contributes to a more equitable distribution of educational opportunities, ensuring Maryland meets its

growing workforce needs. We expect about 5 new students annually to pursue the STEM certificate.

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.

There is a wide variety of STEM related certificates available. A great many of them are Post-Baccalaureate certificates. The Baccalaureate Certificates tend to be specialized and a good number of them are oriented toward teaching STEM courses. We found no evidence of a Baccalaureate STEM Certificate in Maryland that was oriented toward preparing students for a career in risk management or access to entry level positions in STEM-related industry. We believe our program is unique in MD for this reason.

Here are some examples of STEM certificate programs:

- **STEM Instructional Leader (SIL) at McDaniel College**

This program is approved by the Maryland State Department of Education (MSDE) and the Maryland Higher Education Council (MHEC). Students earn a Post-Baccalaureate Certificate and the Instructional Leader: STEM (PreK-6) endorsement from MSDE after completing six courses.

- **Post-Baccalaureate Certificate in Secondary (7-12) STEM Teaching and Learning at Stevenson University**

This 18 credit graduate certificate program is designed for middle or high school math and science teachers.

- **Post-Baccalaureate Certificate in Medical Laboratory Science (STEM) at George Washington University**

This program requires 48 credits in required courses, including the practical.

- **A.S. Degree in STEM at Frederick Community College**
- **A.A.S. Degree in STEM Technology at Frederick Community College**

Offers foundational courses in various STEM disciplines.

- Online STEM Education Certificate Program at Georgia State University

This program offers areas of emphasis in science education, math education, computer science, or integrated middle level.

2. Provide justification for the proposed program.

Notre Dame of Maryland University (NDMU) has a long-standing history of innovation in education and is dedicated to providing accessible and high-quality academic opportunities.

The **Baccalaureate Certificate in STEM Studies** aligns with this commitment by addressing a critical gap in Maryland's higher education landscape. While Maryland offers a strong portfolio of STEM-related degree programs, there are limited certificate programs specifically designed to prepare non-STEM majors for foundational roles in STEM industries.

Maryland's thriving STEM economy, supported by major biotech hubs, federal agencies, and research institutions, requires a workforce with interdisciplinary STEM competencies. The **STEM Studies Certificate** is designed to meet this demand by:

- **Addressing Workforce Gaps:** Preparing non-STEM majors to enter STEM-related fields such as risk management, environmental science, and public health.
- **Fostering Regional Expertise:** Strengthening collaboration between NDMU and organizations like the Pacific Northwest National Laboratory (PNNL), enabling students to gain practical experience and contribute to state and regional initiatives.
- **Supporting Economic Development:** Attracting and retaining talent within Maryland's growing STEM workforce, ensuring the state remains a leader in scientific innovation and technological advancement.
- **Promoting Interdisciplinary Solutions:** Equipping students with foundational knowledge in biology, chemistry, physics, and science communication to address complex societal challenges.

By offering this program, NDMU enhances its academic portfolio and reinforces its role as an institution committed to addressing the educational and workforce needs of the state and region. In addition, the STEM Certificate will help prepare our students for the rigors of NDMU's MS in Risk Management, which the National Laboratories and the National Nuclear Security Administration look to as a pipeline of much needed risk managers.

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

1. Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBI's.

Currently, no Historically Black Institutions (HBIs) in Maryland offer undergraduate STEM certificates tailored to non-STEM majors. Programs at HBIs tend to focus on full degree programs in STEM or traditional STEM pathways for STEM majors. The **STEM Studies Certificate** at NDMU is uniquely designed to target non-traditional students and non-STEM majors, creating a complementary pathway that does not directly compete with existing HBI programs.

By addressing an unmet need, this program has minimal to no impact on existing high-demand programs at HBIs while broadening access to STEM education for underrepresented groups across the state.

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

1. Discuss the program's potential impact on the uniqueness and institutional identities and missions of HBIs.

Given that no HBI in Maryland currently offers a STEM certificate program specifically targeting non-STEM majors, the **STEM Studies Certificate** at NDMU is unlikely to affect the uniqueness or institutional identity of HBIs. Instead, the program complements the mission of HBIs by creating additional opportunities for students to gain foundational STEM skills, which can ultimately contribute to the broader goals of diversity, equity, and inclusion in Maryland's STEM workforce.

By fostering interdisciplinary collaboration and providing equitable access to STEM education, the program aligns with the shared goals of expanding STEM opportunities for underrepresented populations while respecting the distinct missions of HBIs.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes (as outlined in COMAR13B.02.03.10):

1. Describe how the proposed program was established, and also describe the faculty who will oversee the program.

Notre Dame of Maryland University (NDMU) proposes a STEM Certificate program to build on its established strengths in science, technology, engineering, and mathematics education. NDMU has a strong foundation in STEM disciplines with faculty engaged in innovative teaching and impactful research. This program leverages the university's existing infrastructure and expertise to provide specialized training tailored to the needs of the STEM workforce.

Notre Dame of Maryland University (NDMU) has a long history of delivering high-quality, interdisciplinary education in science and related fields. The **STEM Studies Certificate** program was developed to address a critical gap in accessible STEM education for non-STEM majors, leveraging existing faculty expertise, infrastructure, and course offerings. This program builds on NDMU's successful integration of interdisciplinary teaching and research, positioning it to support students entering STEM-related fields.

The faculty overseeing the program are drawn from multiple departments, including Biology, Chemistry, Physics, and Communication Arts, reflecting the program's interdisciplinary nature. A new NDMU agreement with Capital Technology University will provide on-campus access to the cybersecurity course. These faculty members bring diverse expertise and a strong history of teaching and research in their respective fields, providing a robust foundation for the STEM Studies Certificate. Faculty specialties include:

- **Biology:** Research in molecular biology, environmental science, and public health.

- **Chemistry:** Work in analytical chemistry, biochemistry, and materials science.
- **Physics:** Focus on mechanics and experimental techniques.
- **Communication Arts:** Emphasis on science communication and public engagement.
- **Cybersecurity:** Training in data protection, network security, and ethical hacking to address modern technological challenges.

The program was established based on data supporting the demand for STEM-trained professionals and the lack of programs designed to prepare non-STEM majors for interdisciplinary roles. NDMU's commitment to diversity and inclusion ensures that the program addresses educational gaps for underrepresented populations in STEM. The interdisciplinary expertise of NDMU's faculty contributes to a well-rounded curriculum.

Faculty research and teaching methods emphasize hands-on learning, critical thinking, and interdisciplinary collaboration, which align with the program's goals of preparing students for diverse STEM applications.

The program will leverage existing courses, laboratory facilities, and faculty expertise. Resources from NDMU's established science programs ensure minimal additional cost for implementation:

- **Course Capacity:** Existing courses in biology, chemistry, physics, and communication arts provide the foundational content for the certificate.
- **Lab Facilities:** NDMU's laboratories are equipped to support hands-on training for students in STEM fields.
- **Faculty Support:** Current faculty members are sufficient to meet the program's enrollment targets now and into the foreseeable future

Faculty involved in the STEM Certificate program are experienced educators and researchers with a history of success in their respective fields.

- Associate Professor of Physics Brian Christy, Ph.D. Physics, Full-Time
    - Courses: General Physics 1 w/lab, Modern Physics
- Assistant Professor of Biology Jewel Daniel, Ph.D. Biology, Full-Time
    - Courses: Introduction to Biology Research
- Assistant Professor of Communications Avery Griffin, Ph.D. Communications, Full-Time
    - Courses: Mass Media in Society, Digital Media Skills
- Associate Professor of Biology Ian Hall, Ph.D. Biology, Full Time
    - Courses: Biology, Human Anatomy w/lab

- Associate Professor of Biology Jennifer Kerr, Ph.D. Biology, Full-Time
    - Courses: Genetics w/lab, Microbiology w/Lab
- Assistant Professor Jason Labonte, Ph.D. Chemistry, Full-Time
    - Courses: Organic Chemistry w/lab
- Associate Professor Jocelyn McKeon, Ph.D. Chemistry, Full-Time
    - Courses: General Chemistry w/lab, Analytic Chemistry
- Professor Charles Yoe, Ph.D. Agricultural and Resource Economics, Full-Time
    - Courses: Risk Management, Enterprise Risk Management

Additional faculty members will support program delivery as instructors, mentors, and researchers, contributing to a dynamic and interdisciplinary learning environment.

2. Describe educational objectives and learning outcomes appropriate to the rigor, breadth, and (modality) of the program.

The proposed STEM Certificate program aims to equip students with the foundational knowledge, skills, and professional attributes needed to succeed in a variety of STEM-related fields. This program is designed to provide interdisciplinary training in STEM subjects fostering innovation, analytical thinking, and effective communication. The following program learning outcomes (PLOs) outline the specific competencies students will develop:

1. **Foundational Knowledge:** Students will develop a solid understanding of core concepts in physics, biology, chemistry, and cybersecurity that enables them to engage in interdisciplinary scientific work and solve complex scientific and technical problems.
2. **Research and Analysis:** Students will cultivate the ability to apply the scientific method to design experiments, analyze data, and draw evidence-based conclusions in laboratory and research settings to address real-world STEM challenges while adhering to ethical research standards.
3. **Scientific Communication:** Exhibit proficiency in oral and written communication, effectively disseminating findings and engaging with the broader scientific and technical community.
4. **Interdisciplinary Competency:** Apply cross-disciplinary knowledge and skills to develop innovative solutions and collaborate effectively within diverse STEM fields.
5. **Leadership and Professional Development:** Cultivate leadership abilities, professionalism, and teamwork through innovation, cultural awareness, and adaptability in dynamic STEM environments.

3. **Explain how the institution will**:

a) provide for assessment of student achievement of learning outcomes in the program
b) document student achievement of learning outcomes in the program

The STEM Studies Certificate student learning outcomes for the program are evaluated through course level evaluation, curricular level evaluation, and scholarship production. The STEM Certificate program is committed to a culture of continuous improvement through regular assessment cycles. Feedback from students, faculty, and external reviewers from among our partners will guide program evolution, ensuring that it remains aligned with workforce needs and educational best practices. This rigorous assessment process supports NDMU's mission to deliver high-quality, accessible education and prepare graduates for impactful careers in STEM fields.

Course-Level Evaluation:
Students' performance will be measured through course assignments, projects, and exams. Successful completion of coursework (minimum grade of C) and maintenance of a cumulative 3.0 GPA are required for program continuation. Learning outcomes are integrated into course objectives and assignments and are tracked across the curriculum. Faculty will assess each course according to their established departmental procedures.

Curricular-Level Evaluation:

Faculty will coordinate regularly with NDMU's coordinator of the Risk Management program to assure that students who choose to pursue participation in NDMU's program to provide a pipeline of risk managers to its partners in the national laboratories are being well-prepared for the rigors of that program. Students will provide qualitative and quantitative feedback on the curriculum through surveys conducted prior to program completion. This feedback, along with data from a tri-annual curriculum review, will inform programmatic improvements to ensure continued relevance and rigor.

University Assessment Committee:
Program assessment results will be submitted to the University Assessment Committee, which meets monthly to review and provide feedback on assessment activities. This committee, chaired by the Associate Vice President of Academic Affairs, includes faculty, staff, and administrators and produces an annual summary document of academic assessments. If significant adjustments are required, the University Assessment Committee collaborates with program leadership to implement changes.

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

List of Course Titles, semester credit hours and Course Descriptions

Total Program credits: 22

BIO-111 Fundamentals of Biology

Focuses on the structure and function of the fundamental unit of life, the cell. Examines basic biological molecules, membrane structure and function, basic metabolism, photosynthesis, cellular reproduction, evolution, genetics and introductory systematics. In weekly laboratory exercises, students design and conduct experiments to answer scenario-based questions. Includes independent small-group laboratory research project that culminates in a student research symposium. Three hours lecture and four hours laboratory. Designed for students with a strong high school background in biology, chemistry and mathematics. Prerequisite: Satisfactory score on the NDMU Placement Exam or BIO-110 with minimum grade of C, or permission or chair. For STEM majors only. Fulfills general education requirement in natural sciences. [4 credits]

BIO-111L Lab: Fundamentals of Biology

This lab is a co-requisite for BIO 111.

BIO-115 Environmental Science (4 Credits)

Evaluates the relationships between human populations and the natural environment. Introduces the fundamental science needed to critically analyze claims, arguments and evidence related to environmental concerns. Analyzes environmental problems and

issues in terms of the underlying basic physical, chemical, and biological sciences and integrates concepts and information from many fields to support an understanding of the ecology of our planet, how we interact with it, and how our species affects the earth and its life-support systems. Laboratory sessions introduce field techniques for investigating environmental questions. An independently designed and executed research project is completed in the laboratory. Three hours lecture and three hours laboratory. Fulfills general education requirement in Scientific Reasoning. Designed for non-science majors.Co-requisite: BIO-115L. [4 credits]

BIO-115L Lab: Fundamentals of Biology

This lab is a co-requisite for BIO 115.

CHM-110 General Chemistry I

Focuses on fundamental chemical concepts and principles with emphasis on inorganic compounds. Explores descriptive and quantitative aspects of chemistry, including atomic and molecular structure, chemical bonding, states of matter, solutions, basic thermodynamics, electrochemistry, equilibrium, acids and bases, and kinetics. Laboratory is coordinated with lecture and emphasizes basic techniques such as titration, spectroscopy, and quantitative and qualitative analysis, along with inorganic synthesis and calculator-based experiments. Three lectures, one discussion period and one laboratory each week. High school algebra required. Satisfies the general education requirement in natural science. [4 credits]

CHM-110L Lab: General Chemistry I

This laboratory is a co-requisite for CHM-110 General Chemistry I.

PHY-101 General Physics I

Examines the fundamental physical laws of nature and their use in understanding natural phenomena. Course provides a knowledge base for study in all areas of science and mathematics. Topics include kinematics, conservation of energy and momentum, dynamics of motion, Newton's laws, rotational mechanics, and waves. Special topics such as the universal law of gravity and fluids will be covered depending on time and student interest. Development of the concepts of vector algebra and calculus are provided as needed. Three lectures, one three-hour laboratory weekly. Course must be taken with PHY-101L. Pre-requisites: MAT-107 or MAT-110 or MAT-211. Students intending to continue with PHY-102 should take MAT-211. [4 credits]

PHY-101L Lab: General Physics I

This lab is a co-requisite for PHY 101.

CST-171 Programming Concepts

Introduces computer programming using the Python programming language. Emphasizes logical approaches for algorithmic solutions to solve realistic applications. Explores programming structures such as decisions, repetitions, sub procedures, functions, and arrays using program design with object-oriented concepts. Introduces a variety of program types to meet various business needs. Fulfills the general education requirement of thinking critically and analytically. [3 credits]

COM 3XX Health Science Communication

This course will be designed and developed once the certificate is approved. It is designed to equip students with the skills necessary to effectively communicate complex scientific concepts to both specialized and general audiences. Through a combination of lectures, workshops, and practical assignments, students will explore various communication methods, including writing, speaking, and digital media, to convey scientific ideas clearly and accurately. The course will cover strategies for engaging diverse audiences, simplifying technical information without compromising accuracy, and addressing misinformation. Students will also learn how to tailor their communication approach to different formats, such as reports, presentations, media outreach, and public engagement. [3 credits]

Total Program credits: 22

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

N/A

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

N/A

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

N/A

8. Provide assurance and any appropriate evidence that the proposed program will provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technology competence and skills, technical equipment requirements, learning management system, availability of academic support services and financial aid resources, and costs and payment policies.

Faculty Interactions

The STEM Certificate program will be delivered in a face-to-face modality with the flexibility offer select courses in a hybrid or on-line modality if future circumstances warrant to maximize flexibility and accessibility for students. Key features of faculty-student interactions include:

Course materials, including lectures and supplementary resources, will be delivered in an in-person mode. Support materials will be available through Canvas, the university's learning management system (LMS).

Faculty will maintain regularly scheduled office hours and conduct scheduled remote face-to-face meetings using Zoom or Teams, as outlined in course syllabi. These sessions will provide opportunities for clarification, discussion of course content, and direct interaction between students and instructors.

Assessments for didactic and laboratory courses will be administered in-class. Depending on the course, assessments may include multiple-choice exams, short-answer questions, or detailed written responses. Laboratory courses will be conducted in person to ensure hands-on learning and mentorship.

Academic Infrastructure and Support

NDMU uses Canvas as its LMS, supported by a robust IT infrastructure designed to handle expected enrollment levels and ensure seamless delivery of any and all online content.

Academic support is provided by the University's Academic Support Team. Students needing official accommodation are required to meet with the University's Director of Accommodations to determine their legally appropriate accommodations. The University also provides support for commuting students with a commuter lounge, as well as designated quiet study spaces throughout campus. NDMU provides all students with mental health support through its counseling office, where students are able to receive professional counseling free of charge with unlimited sessions.

The University's financial aid office is staffed by a Director of Financial Aid and two other staffers. The office is responsible for accurate distribution of financial aid, aid appeals, and other student-facing financial aid decisions. The office reports to the Vice President for Enrollment Management/Marketing & Student Services, allowing for the needed relationship between students' ability to access federal, state, and private funds and an institutional system that oversees the regulation of this aid.

All program costs and payment plans are reviewed by financial aid, the program director, the dean of the appropriate college, the CFO, and the VP of Student Services. Once costs are agreed upon, these plans are published on the University's website and the University's *Catalog*.

9. Provide assurance and any appropriate evidence that advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available.

Advertising, recruiting, and admissions materials for the STEM Certificate program will adhere to rigorous standards for accuracy, transparency, and clarity. Measures include:

- **Review and Approval Process:**
  All materials are reviewed by the program chair, the Dean of the School, and the Vice President of Enrollment Management/Marketing to ensure accuracy and alignment with program goals and institutional standards.
- **Accreditation Oversight:**
  As part of NDMU's ongoing Middle States accreditation self-study, the university systematically evaluates the truthfulness and clarity of recruiting and marketing materials. Identified errors are promptly corrected, and an institutional assessment process supports continuous improvement.

This comprehensive process ensures that prospective students receive accurate and up-to-date information about the program and available services.

H. Adequacy of Articulation (as outlined in COMAR 13B.02.03.19)

1. If applicable, discuss how the program supports articulation with programs at partner institutions. Provide all relevant articulation agreements. More information for Articulation Agreements may be found here.

   N/A (no articulation agreements)

I. Adequacy of Faculty Resources (as outlined in COMAR 13B.02.03.11).

1. Provide a brief narrative demonstrating the quality of program faculty. Include a summary list of **faculty with appointment type, terminal degree title and field, academic title/rank, status (full-time, part-time, adjunct) and the course(s) each faculty member will teach in the proposed program.**

All the courses for the STEM Certificate will be taught on campus in a face-to-face environment. All courses will be taught by current faculty in the Schools of Arts, Sciences and Business and the School of Nursing. All didactic courses are team taught, remote and asynchronous. Didactic lecture materials including video/audio recordings for asynchronous learning will be posted in the Canvas Learning Management system. The Biostatistics course will be taught by adjunct faculty. The adjunct faculty will be hired by Fall 2025 for this course to be offered in SP of 2026.

2. Demonstrate how the institution will provide ongoing pedagogy training for faculty in evidenced-based best practices, including training in:

a) Pedagogy that meets the needs of the students

b) The learning management system

c) Evidenced-based best practices for distance education, if distance education is offered.

Faculty teaching in the STEM Studies Certificate program will have expertise in their respective disciplines, including biology, chemistry, physics, cybersecurity, and communication arts. All current faculty members have advanced degrees in their fields and extensive experience teaching in NDMU's undergraduate curriculum. Their interdisciplinary expertise ensures a high-quality academic experience tailored to meet the needs of non-STEM majors transitioning into STEM-related fields.

NDMU prioritizes faculty development through regular training on evidence-based teaching practices designed to engage diverse learners. Faculty will participate in workshops and training sessions focused on pedagogical strategies that support students from non-traditional and underrepresented backgrounds, ensuring the program aligns with the University's mission of inclusivity and excellence.

Canvas, NDMU's newly adopted learning management system (LMS), will serve as the primary platform for the STEM Studies Certificate program. All faculty will receive comprehensive training in using Canvas, including creating accessible course content, managing assignments, and fostering student engagement through discussion boards and interactive tools.

NDMU's instructional design team will work closely with faculty to ensure they are proficient in leveraging Canvas features to enhance both in-person and hybrid learning experiences. Faculty will also have access to ongoing technical support and professional development resources to stay updated on best practices in LMS usage.

While the STEM Studies Certificate program will primarily consist of face-to-face and hybrid courses, the program may include select asynchronous online components. Any online elements will meet the rigorous standards of Quality Matters™ (QM), an evidence-based framework for online course design. Faculty teaching these courses will either demonstrate prior experience with online teaching or complete training on online pedagogy before offering courses.

Faculty will:

- Engage in training sessions on Quality Matters™ principles to ensure consistent and effective online course design.
- Learn to create interactive and accessible course materials that meet the needs of diverse learners.
- Collaborate with instructional designers to develop engaging and effective online content, ensuring alignment with NDMU's mission.

Hybrid and online course delivery, if used, will include:

- **Asynchronous Content:** Recorded lectures and interactive assignments uploaded to Canvas.
- **Synchronous Components:** Regularly scheduled virtual face-to-face discussions via Zoom or Teams, as specified in course syllabi, to foster student-faculty interaction.
- **Assessments:** Online assessments tailored to course content, such as quizzes, written assignments, or discussion-based evaluations.

Hands-on courses, such as laboratory-based modules or capstone projects, will be conducted in person to ensure students gain practical, applied skills.

NDMU is committed to maintaining high-quality distance and hybrid education, adhering to the C-RAC Guidelines as outlined in COMAR 13B.02.03.22C. All online and hybrid aspects of the program will meet the same standards of rigor and quality as face-to-face courses. The following resources will be provided:

- **Faculty Training and Support:** Regular workshops on pedagogy, Quality Matters™ standards, and technology integration will be available. An instructional designer will assist faculty during program development and launch to ensure consistency across courses.
- **Student Support Services:** Students enrolled in online or hybrid courses will receive:
    - A thorough orientation to online learning platforms and resources.
    - Clear guidelines on technology requirements (hardware, software, and internet connectivity).
    - Access to a 24/7 help desk and robust technical support.
    - Comprehensive library resources, including e-books and research databases.
    - Advising services to ensure students understand program requirements and expectations.

NDMU's established infrastructure, faculty expertise, and commitment to professional development ensure the STEM Studies Certificate program will deliver a rigorous and engaging academic experience for students, regardless of the modality of instruction. This structure supports the program's mission to expand STEM education to a broader and more diverse student population.

J. Adequacy of Library Resources (as outlined in COMAR 13B.02.03.12).

1. Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program.

Since its opening in 1973, the Loyola/Notre Dame Library has served as a critical resource for outstanding teaching and scholarship. Notre Dame and Loyola have recently completed a joint renovation and expansion project. The results of this project are expanded use of technology for teaching and learning; accommodation of greater numbers of students, faculty and community patrons; and vibrant, vital center for scholarly exploration and achievement.

The Loyola/Notre Dame Library is open 7 days a week during the fall, spring, and summer semesters. The Loyola Notre Dame Library provides information services and resources to support the academic programs and educational concerns of Notre Dame of Maryland University and Loyola University Maryland. Through the Library's website, faculty, students and staff may

access an extensive array of books, journals, databases, and streaming video to support research, teaching, and learning.

The library's collection consists of 455,000 volumes, 1,421 print and 22,126 electronic periodical subscriptions, and 39,000 media items. The library's web site is the gateway to a wealth of information, including over 120 online databases, which provide access to over 300,000 journals, magazines, and newspapers in print and electronic formats. The Loyola Notre Library's Online Journal holdings are substantial, including 143 peer reviewed Journal titles.

Additionally, the Library provides access to collections at other partner libraries:

- The University System of Maryland and Affiliated Institutions consortium provides access to over 9 million items at 17-member libraries.
- The Eastern Academic Libraries Trust (EAST), a print archive that guarantees access to 6 million volumes via Interlibrary Loan.

Assistance Provided:

- Students, faculty and staff may request help in-person, via email, instant messaging, and telephone.
- Online chat reference is available 24 hours a day, seven days a week.
- Information about copyright is available through a resource guide, workshops and individual consultations provided by a librarian in the Copyright Information Center.

Other Library Resources:

- 693 individual seats are available for studying in addition to the learning spaces below:
- 100-seat auditorium
- Two computer instructional labs: Lab A has 20 seats; Lab B has 30 seats
- The *Collaboratory at the Library*, an active learning space that accommodates up to 22 students in a flexible environment
- 24-seat screening room cyber cafe and a multi-functional gallery used for events and flexible study space group study areas
- seminar rooms
- 91 computers with Microsoft Office and access to the Internet
- Adaptive technology mainstreamed throughout the Library to provide access for disabled users
- Makerspace, a technology-rich environment that fosters creation, innovation, and collaborative learning.

The library currently maintains access to a complete set of databases needed to service and support the existing STEM programs at NDMU and Loyola University. The library already has books and periodicals in its extensive collection that are specific to STEM studies Students also have access to the needed books and journals because of the University System of Maryland and Affiliated Institutions consortium, which provides access to over 9 million items at 17 member

libraries. In addition, the Eastern Academic Libraries Trust (EAST) print archive guarantees access to 6 million volumes via Interlibrary Loan.

K. Adequacy of Physical Facilities, Infrastructure and Instructional Equipment
(as outlined in COMAR 13B.02.03.13)

1. Provide an assurance that physical facilities, infrastructure and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and faculty offices, and laboratories for studies in the technologies and sciences.

NDMU's School of Arts, Sciences and Business has adequate facilities to support the STEM Studies Certificate. Moreover, the recent (FY21) renovations of the Knott Center for Science and Innovation on campus further enhanced the physical resources, infrastructure, and equipment availability. The didactic portion of the certificate is intended to be delivered face-to-face and when required virtually and asynchronously though Zoom and/or Teams. No new facilities are required for this program as all the required courses are already being successfully taught.

Physical Facilities

Faculty Offices

Currently there is individual office space for each member of the science faculty who teaches courses included in the STEM Studies Certificate. Individual offices allow sufficient privacy to work with students or meet with colleagues. They are fully furnished and support the use of technology.

Because collaboration between students, staff, faculty and administration is critical, the renovations to the ground and first floor of the Knott Science Center, and other buildings that may be used for this program have focused on fostering interactions between all school stakeholders.

Instructional Spaces

NDMU has technology, support, and expertise to offer courses across a variety of modalities including face to face and hybrid. There is a staffed Faculty Resource Center and instructional course design support. In addition, NDMU has a state-of-the art global classroom that supports superior web conferencing, internet collaboration across institutions, mobile screen sharing, HD resolution, video collaboration, and the ability to build collaboration-enabled Zoom conference rooms. NDMU currently supports a Canvas Learning Management System where faculty may deposit course materials, facilitate online instruction (through Panapto), quizzes and exams, host chat and discussion board collaboration, and engage with students outside of the classroom to enrich the learning experience.

The entire campus hosts a wireless community to support mobile and web-based collaboration and communication. NDMU also supports learners with a well-staffed and supportive technology helpdesk.

The School of Arts, Sciences and Business has access to all instructional spaces, all of which are "smart" and accommodate different class sizes and instructional design. Several large lecture styles classrooms are available for use and can easily accommodate the current class size. These include Knott Auditorium, third floor of Knott Science Center, Bunting 220 and LNDL Auditorium.

The School currently operates three teaching laboratories housed in the Knott Science Building where students can practice their science skills.

2. **Provide assurance and any appropriate evidence that the institution will ensure students enrolled in and faculty teaching in distance education will have adequate access to:**

a) An institutional electronic mailing system, and
b) A learning management system that provides the necessary technological support for distance education

a) All students and faculty at NDMU are provided an email and password through the University's secured, cloud-based email system. Students and faculty can access their institutional email account from any device through the University's website. Those who forget their password can change it through an automated system or contact the University's help desk for assistance.

b) Canvas LMS is an essential technological backbone for supporting the Master's in Pharmaceutical Sciences program, enabling a rich and dynamic distance learning experience. In a program where advanced pharmaceutical knowledge, research skills, and industry-relevant competencies are critical, Canvas provides the structure, tools, and resources needed to ensure students can excel, regardless of their geographic location.

Students in the STEM Studies Certificate program are not expected to enroll in distance education courses

L. Adequacy of Financial Resources with Documentation (as outlined in COMAR13B.02.03.14)

1. Complete **Table 1: Resources and Narrative Rationale**. Provide finance data for the first five years of program implementation. Enter figures into each cell and provide a total for each year. Also provide a narrative rationale for each resource category. If resources have been or will be reallocated to support the proposed program, briefly discuss the sources of those funds.

FINANCE DATA

Finance data for the first five years of program implementation are shown in Table 1: Resources and Table 2 –Expenditures. These tables have been constructed to show changes in resources and expenditures. These impacts are negligible.

TABLE l: Resources

1. Reallocated Funds-No funds will be reallocated to implement this program. The courses would all ordinarily be offered with or without this certificate. There will be no impact on existing programs and organizational units.
2. Tuition and Fee Revenue-No additional tuition or fee revenue is anticipated to be generated by this program. Any potential impact on overall enrollment is expected to be negligible. Students who elect to participate in the program will be students majoring in programs outside the natural sciences.
3. Grants and Contracts-There will be no grants or contracts attributable to this program.
4. Other Sources-There is some potential that NNPL would provide limited scholarship funds in the future, if this certificate program is expanded into a STEM Major that is specifically targeted for the MS in Risk Management and subsequent employment with one of the National Labs. This possibility is best regarded as speculative at this time.
5. Total Year-Given the above considerations there is no need for funding specifically for this program.

TABLE 1: PROGRAM RESOURCES					
	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)	$0	$0	$0	$0	$0
a. Number of F/T Students	5-8	5-8	5-8	5-8	5-8
b. Annual Tuition/Fee Rate	$0	$0	$0	$0	$0
c. Total F/T Revenue (a x b)	$0	$0	$0	$0	$0
d. Number of P/T Students	0	0	0	0	0
e. Credit Hr. Rate	$0	$0	$0	$0	$0
f. Annual Credit Hrs.	$0	$0	$0	$0	$0
g. Total P/T Revenue (d x e x f)	$0	$0	$0	$0	$0
3. Grants, Contracts, & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (Add 1 – 4)	$0	$0	$0	$0	$0

TABLE 2: EXPENDITURES

1. Faculty (# FTE, Salary, and Benefits)-There is no need for any new faculty, there is no change in anyone's workload. There are no new faculty salary or benefit expenditures associated with a certificate that is a simple bundling of existing courses.
2. Administrative Staff (# FTE, Salary, and Benefits)-There is no need for any new administrative staff, there is no change in anyone's workload. There are no new administrative staff salary or benefit expenditures associated with a certificate that is a simple bundling of existing courses.
3. Support Staff (# FTE, Salary, and Benefits)-There is no need for any new support staff, there is no change in anyone's workload. There are no new support staff salary or benefit expenditures associated with a certificate that is a simple bundling of existing courses.
4. Equipment-No new equipment is required to support this program.
5. Library-There will be no new expenditures for library materials directly attributable to the new program.
6. New and/or Renovated Space-There is no need for any special facilities (general classroom, laboratory, office, etc.) that will be required for the new program. Existing facilities will be sufficient.
7. Other Expenses-There will be no additional expenses for faculty development, travel, memberships, office supplies, communications, data processing, equipment maintenance, rentals, or any other category as a result of this program.
8. Total Year-Absent any changes in expenditures that annual change in expenditures is expected to be zero for each year of the program.

TABLE 2: PROGRAM EXPENDITURES					
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Faculty (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
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
8. TOTAL (Add 1 – 7)	$0	$0	$0	$0	$0

M. Adequacy of Provisions for Evaluation of Program (as outlined in COMAR 13B.02.03.15).

1. Discuss procedures for evaluating courses, faculty and student learning outcomes.

2. Explain how the institution will evaluate the proposed program's educational effectiveness, including assessments of student learning outcomes, student retention, student and faculty satisfaction, and cost-effectiveness.

The **STEM Studies Certificate Program** will use a comprehensive program evaluation model to

ensure academic excellence and alignment with institutional goals. Both qualitative and quantitative measures will be employed to assess program effectiveness, providing formative feedback throughout the students' progression and summative insights reflecting cumulative outcomes.

Evaluation methods will include:

- **Course Evaluations:** Students will evaluate courses and instructors based on existing practices of the SASB and the individual departments. Evaluations will assess teaching effectiveness, course relevance, and alignment with learning outcomes. Results will be analyzed to identify strengths and areas for improvement.
- **Faculty Evaluations:** Faculty performance will be evaluated annually through a combination of student feedback, peer reviews, and self-assessments. Faculty members will be required to demonstrate alignment with program goals and evidence of continued professional development.
- **Student Learning Outcomes:** Assessment of student learning outcomes will be embedded in each course through a mix of assignments, exams, and projects. These assessments will evaluate students' mastery of foundational STEM concepts, problem-solving abilities, and science communication skills.

Regular reviews of course delivery and learning outcomes will guide curriculum updates and teaching strategies. The educational effectiveness of the program will be evaluated using the following metrics:

1. **Student Learning Outcomes:**
    - Learning outcomes will be assessed through course-specific assignments, and self-reported evaluations by students.
    - Rubrics will measure mastery of foundational STEM skills, critical thinking, and interdisciplinary collaboration.
2. **Student Retention:**
    - Retention rates will be monitored to ensure students progress through the program without undue barriers. Intervention strategies will be implemented to support students facing academic challenges.
3. **Student and Faculty Satisfaction:**

- Satisfaction surveys will be distributed to both students and faculty at the end of each semester. Surveys will measure satisfaction with course content, teaching quality, advising support, and overall program effectiveness.
- Faculty will report satisfaction with resources, workload, and alignment with program goals.

The STEM Studies program's success will be evaluated based on the following goals and metrics:

1. **Academic Excellence:**
    - 80% of students will report satisfaction with courses, faculty, and program administration.
    - Faculty will achieve an average rating of 4 or higher on a 5-point Likert scale for teaching effectiveness.
2. **Student Retention and Success:**
    - 80% of students who begin the program will complete it.
    - 80% of graduates will report satisfaction with the program's alignment to their personal and professional goals.
3. **Graduate Outcomes:**
    - At least 50% of program participants will enroll in the Master of Science in Risk Management program.

This robust evaluation framework ensures the **STEM Studies Certificate Program** meets its academic, operational, and institutional objectives, fostering a culture of continuous improvement and student success.

N. Consistency with the State's Minority Student Achievement Goals
(as outlined in COMAR 13B.02.03.05).

1. Discuss how the proposed program addresses minority student access & success, and the institution's cultural diversity goals and initiatives.

The proposed STEM Studies Certificate serves the University's mission of providing transformational educational experience for underserved populations. The University has a long history of providing access, opportunity, and success to minority students.

Any student meeting the admissions requirements can apply to the Certificate program. The program will use a holistic admissions process that supports a diverse student body. The program will work to help all accepted students improve their workplace competitiveness and professional goals; an aim consistent with the State's minority student achievement goals.

In addition, Notre Dame of Maryland University is proud to have a significant number of minority students. The University continues to support historically under-represented groups in its recruiting, its financial aid packages, and its highlighting of student success.

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

1. If the proposed program is directly related to an identified low productivity program, discuss how the fiscal resources (including faculty, administration, library resources and general operating expenses) may be redistributed to this program.

N/A

P. Adequacy of Distance Education Programs (as outlined in COMAR 13B.02.03.22)

1. Provide affirmation and any appropriate evidence that the institution is eligible to provide Distance Education.
2. Provide assurance and any appropriate evidence that the institution complies with the C-RAC guidelines, particularly as it relates to the proposed program.

The certificate is not intended to be offered as a distance education program. If future circumstances should require distance education options, Notre Dame of Maryland University has been approved by Middle States Commission on Higher education, its regional accreditor, to offer distance education. Distance education supports the NDMU mission of empowering leaders from historically underrepresented communities, as well as its focus on providing professional education to a variety of students. The MSCHE website affirms these statements, with the approval of program through Distance Education listed under Alternative Delivery Methods

Since 2014, NDMU has participated in NC-SARA, allowing it to offer online courses in most states. The authorization to provide distance education is found at nc-sara.org.