



New Hampshire

Department of Education

Learn Everywhere Program Initial Application

1.0 Applicant Information [Ed 1403.01(a)(2)].

Organization Name: Advanced Regenerative Manufacturing Institute, Inc.

Name of Primary Contact: Karla Talanian, Chief Education and Workforce Officer

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2.0 Purpose, mission statement, or both [Ed 1403.01(a)(1)].

The Advanced Regenerative Manufacturing Institute (ARMI) is a New Hampshire membership-based, not-for-profit organization. It was awarded \$80 million by the Department of Defense to operate the BioFabUSA program.

The mission of ARMI | BioFabUSA is to enable the scalable, consistent, and cost-effective manufacturing of engineered tissues and tissue-related technologies to benefit existing industries and grow new ones. As a part of this effort, ARMI | BioFabUSA is working to close the educational skills gaps in tissue engineering and organ manufacturing through accessible education and training opportunities.

BioTrek, a program of BioFabUSA, is a project-based learning program inspired and designed to provide all students with a foundational understanding of biofabrication as an industry with unlimited career opportunity.

3.0 A description of the demonstrated instructor qualifications required for the program(s) and a statement assuring that the instructor(s) satisfies those qualifications [Ed 1403.01(a)(3)].

The designated teachers for the ARMI | BioFabUSA Micro-Internship will have undergraduate and advanced degrees in science from accredited colleges or universities. And all will have at least a NH state certification to teach science at the high school level.

ARMI | BioFabUSA assures that all instructors will satisfy the above qualifications requirement.

4.0 A criminal history records check policy that includes a statement affirming that the sponsoring entity shall not allow instruction or student contact by a person who has been charged pending disposition for, or convicted of, any violation or attempted violation of any of the offenses as outlined in RSA 189:13-a, V pursuant to a criminal history records check

conducted by the department of safety as outlined in Saf-C 5703.06 through Saf-C 5703.11 [1403.01(a)(4)].

In accordance with SaF-C 5703.06-11, “All staff, contractors, and volunteers will be subject to a criminal background check and child welfare and private adoption agency systems check as required by He-C 4003.14 – “Verification of Staff Qualifications.”

ARMI will complete pertinent staff background checks before students enter the facility.

ARMI | BioFabUSA affirms that they shall not allow instruction or student contact by a person who has been charged pending disposition for, or convicted of, any violation or attempted violation of any of the offenses as outlined in RSA 189:13-a, V pursuant to a criminal history records check conducted by the department of safety as outlined in Saf-C 5703.06 through Saf-C 5703.11.

5.0 For the proposed instructional program(s), identify the education, program, or opportunity from Ed 306.27(v) for which students completing the learn everywhere program shall receive high school credit(s) [Ed 1403.01(b)(1)(a)].

For 2023, students that successfully complete the ARMI | BioFab Micro-Internship program would be awarded a certificate for 0.25 credit as an Open Elective toward meeting high school graduation requirements. Future enhanced iterations may offer science credit.

This ARMI | BioFab Micro-Internship program in conjunction with VLACS will offer 0.25 credit for career exploration pursuant to **Section Ed 306.35** - Career Education Program.

6.0 An outline of each program for which approval is sought, which includes goals, competencies, a detailed description of the course of instruction, and a description of expected student outcomes [Ed 1403.01(b)(1)(b)]. A description of assessments of student learning outcomes

The 25-30 hour BioTrek program is offered to schools as a five-week program that is embedded within their science-based classes, including biology, anatomy and physiology or CTE health science, etc. The Learn Everywhere extended learning opportunity model offers a 30-hour weeklong summer workshop or 24-hour after school version of four hours per week for six to seven weeks.

The BioTrek programs align with the NGSS and Career standards.

Learning Outcomes:

Students will learn to accurately explain and apply concepts of:

- Biofabrication,
- Biomanufacturing,
- Regenerative medicine,
- Regenerative manufacturing,
- Cell biology
- Cell differentiation
- Transplantation
- Advanced technologies, and

- Tissue engineered medical products (TEMP).

Students should have prior understanding of basic biology concepts or have already successfully completed a biology course prior to signing up.

Students will explore core principles of BioTrek:

- Career opportunities
- Entrepreneurship
- Next-generation technologies of biofabrication

Students will work in teams improve skills of:

- **Collaboration**, by working with the team to identify a problem focus and product strategy
- **Independence**, by completing assigned tasks
- **Leadership**, by taking charge organically

Students will develop academic skills:

- **Research** limitations and challenges of the healthcare field to offer treatments for debilitating diseases and injuries.
- **Evaluate** current treatments and **conceptualize** a superior alternative
- **Gather and analyze** demographic and financial data
- **Present findings** to different audiences

In the four phases of the BioTrek programs, the core principles are embedded within a student-led, design-thinking approach to problem solving that motivates students to assume the role of scientists, engineers, and business entrepreneurs. Students research, debate, then by consensus agree to focus on one medical problem that can be addressed with the science of biofabrication.

Phase 1: Problem Identification

Student teams discuss medical-related problem options then concentrate on a specific problem area that holds real meaning for them, i.e. ACL repair, heart disease, cancer. In a collaborative learning model, students will research problem to identify data, demographics, and relevant advances in treatment to conceive a tissue engineered medical product (TEMP) that could offer a better treatment of that problem. Students focus on improving outcomes for patients.

The process encourages students to develop a sense of empathy as they research the problem and come to understand the impact of the problem in their family, community, or society as a whole.

Phase 2: Product Development

Students research challenges in the healthcare system and medical problems that can be addressed with the science of biofabrication and biomanufacturing. Through direct instruction enhanced by independent research, teams of students learn how to approach and solve complex problems. They will be prepared to accurately use and apply relevant terminology.

Terminology learned:

- TEMP, tissue engineered medical product
- Autologous
- Allogeneic
- Growth factors and media
- Bioreactors

- Cell Growth and differentiation
- Decell-Recell
- 3D Bioprinting
- Stem cells
- Scaffolds
- Biocompatibility
- iPSC (induced pluripotent stem cells)
- MSC (mesenchymal stem cells)

Phase 3: Business model and Entrepreneurship

Students develop a sense of entrepreneurship as they formulate an imaginary business entity that will identify problem data, marketing strategy, and financial models for their conceived TEMP. They will be prepared to explain relevant terminology.

Terminology learned:

- Outsource
- Financial modeling
- Gross profit margin
- Target market
- Market gap
- Entrepreneurship

Phase 4: Presentation

In the final presentation experience of Phase 4, students demonstrate understanding of what they learned by accurately applying terminology and explaining methods in their responses to questions from the panel of judges. In this process, students:

- Learn how to interact with industry advisors,
- Apply learned knowledge to new perspectives
- Develop presentation skills

As a result of these unique experiences, students gain:

- Perspective on the professional opportunities available in the advanced manufacturing and technology sectors
- Increase awareness of the education and training pathways required to work in these fields

The BioTrek program is aligned with the NGSS and Career standards.

7.0 A plan for recording student progress in meeting expected student outcomes for each course of instruction [Ed 1403.01(b)(1)(c)].

Recording progress:

Formative written assessment, class and individual discussion, teacher observations, and final summative assessment can be documented.

8.0 A description of how the assessment of student learning outcomes will be done [Ed 1403.01(b)(1)(d)].

Observation and formative assessments for each phase of the program assess understanding of

essential terminology and advanced technologies as presented.

The final presentation serves as a **summative assessment** of knowledge acquired. For the problem they chose, the student teams present their learning to identify, quantify, and explain the tissue engineered medical product conceived to address that problem. Their business plan will exemplify their understanding of financing, business strategy, market analysis, and marketing of that product.

In their presentation pitch deck and responses to panel questions, students are expected to apply research and the aforementioned terminology with at least 80% accuracy within the required components of the presentation.

Final presentation components:

- Problem overview
- Product development and components
- Key industry partners
- Treatment methods
- Financial modeling
- Selected advanced technologies
- Shared team presentation roles
- Presentation skills

Long term outcome:

The ultimate goal of BioTrek is to illuminate diverse education, training, and career opportunities within the industry of biofabrication and inspire students of all backgrounds to include and consider biofabrication in their post-high school planning dialog. ARMI seeks to open career opportunities to everyone interested in joining the biofabrication workforce. Exposure to this new field, the science and technology involved, and the many types of professional careers that comprise it will increase awareness and broaden the aspirations of students who participate in this program.

9.0 The number of credits each proposed course of instruction will fulfill [Ed 1403.01(b)(1)(e)].

Students will earn 0.25 credits at the completion of the 5 day, 25 hour course.

10.0 A description of the competency-based grading system to be used for each proposed course of instruction [Ed 1403.01(b)(1)(e)].

Students will demonstrate an understanding of ARMI I BioFabUSA Micro-Internship Career Preparation by explaining the required responsibilities and training for the career addressed.

Students will demonstrate an understanding of ARMI I BioFabUSA Micro-Internship Career Tasks by completing the micro-internship and the required deliverable(s).

BioTrek Assignments

Assignment	Formative or Summative?	Grade scale	Grading criteria
Problem Pitch Presentations Teacher Graded or Self-Assessment	Formative	/5	Problem Pitch Rubric
Phase 1 Workbook Check	Formative	/10	Completion, thoroughness
Industry Day Activity	Formative	/10	Completion, thoroughness
Systems Diagram Check-in (Phase 2 Workbook Check)	Summative	/25	Completion, and accuracy if each element is well-reasoned
College Day Activity	Formative	/10	Completion, thoroughness
Phase 3 Workbook Check	Formative	/10	Completion, thoroughness
Final Pitch Rehearsal Teacher graded	Formative	/15	Final Rehearsal Feedback Form (PM.24)
Self-Assessment or Peer Evaluation	Formative	/5	
Final Pitch and Project Grade	Summative	/100	Final Pitch Rubric (PM.21)
Final Pitch Self-Assessment	Summative	/10	Final Pitch Rubric (PM.21)

Supplementary Assignments

Assignment	Formative or Summative?	Grade scale	Grading criteria
BioFab Explorer Activity	Formative	/10	Completion, thoroughness
Bioreactor Lab Activity	Formative or Summative	/20	Completion, thoroughness, accuracy
Ghostly Heart Activity	Formative	/10	Completion, accuracy
Peer Evaluation/Collaboration Grade	Summative	/10	Peer Evaluation Responses

11.0 A description of methods for admission which shall not be designed, intended, or used to discriminate or violate individual civil rights in any manner prohibited by law [Ed 1403.01(b)(2)(a)].

Students will complete an application that expresses their level of familiarity and understanding of biofabrication and identifies science courses they successfully completed to date. This is not designed as a prerequisite to entry, but rather to set realistic expectations about prior knowledge so that our teachers can present the material in the most appropriate and beneficial way.

Acceptance into this 24 hour course requires the completed application, parent approval, and interview. The application process is not designed, intended or used to discriminate or violate individuals civil rights in any manner prohibited by law, but is used by ARMI | BioFabUSA staff to assess student interest, goals, grade level, credit requirement (if any) and experience.

Students seeking school credit will be required to disclose their school and district information, including the name and contact information for their school guidance department.

There is no fee to participate in program.

12.0 A description of how the program will liaison with the local education agency (LEA) for students with an education plan pursuant to section 504 of the Rehabilitation Act [Ed 1403.01(b)(2)(b)].

Instructors will review 504 plans with the student to identify supports necessary to ensure equal access to the curriculum and success in the program.

13.0 A description of how the program will liaison with the LEA for a student with disabilities, consistent with the student's IEP [Ed 1403.01(b)(2)(c)].

Instructors will review IEP plans of students with identified learning challenges that are provided by as part of the application process. If appropriate, instructors will provide accommodations

described in the IEP and differentiate assignments and activities so students may successfully participate in the program. As warranted, by request or observed need, the instructor will arrange a meeting with a representative of the LEA to address learning challenges and consider remedies that will promote a positive outcome for the student.

If ARMI | BioFabUSA determines it will be unable to provide the required accommodations and or/or modifications for a student as defined in the learning plan, the parents will be informed before they commit to enrolling their child in the program.

- 14.0 A statement that the applicant understands that it has certain responsibilities, pursuant to Section 504 of the Rehabilitation Act, if it receives federal funds, or the Americans with Disabilities Act, as amended, to provide students with disabilities with equal access and equal opportunities to participate in the learn everywhere program, including by providing the student with reasonable accommodations [Ed 1403.01(b)(2)(d)].**

In accordance with the Americans with Disabilities Act, ARMI instructors understand their legal obligation to provide the accommodations identified in the Individualized Education and 504 Plans for students who provide plans for collaboration.

ARMI |BioFabUSA understands that it has certain responsibilities pursuant to Section 504 of the Rehabilitation Act, if it receives federal funds, or the Americans with Disabilities Act, as amended, to provide students with disabilities equal access and equal opportunities to participate in the Learn Everywhere program, which might include providing the student with reasonable accommodations [Ed 1403.01(b)(2)(d)].

- 15.0 A description of facilities to be used for educational instruction and a description of how the facilities will meet the priorities of the program [Ed 1403.01(b)(3)(a)].**

All instruction for the BioTrek Extended Learning Opportunity and the ARMI | BioFabUSA Micro-internship will take place in the classroom at 500 N. Commercial Street, Manchester, NH 03101. Enrichment opportunities, including tours of laboratories at 400 and 540 N. Commercial Street, will be established prior to the first day of class. The classroom is not a laboratory.

- 16.0 A statement affirming that the facilities shall comply with all applicable federal and state health and safety laws, rules, and regulations [Ed 1403.01(b)(3)(b)].**

ARMI affirms that it complies with all applicable federal and state health and safety laws, rules, and regulations, as required by the Department's rule Ed 1403.01(b)(3)(b).

- 17.0 Disclosure of insurance, if any, which would cover the participants in the Learn Everywhere program [Ed 1403.01(b)(4)].**

ARMI maintains general liability insurance on its facilities in the amount of \$1 million per occurrence and \$2 million aggregate that covers liability for injuries sustained while on ARMI's premises.

ARMI is currently in the process of purchasing additional insurance to cover liabilities related to injuries that may be caused to students due to the misconduct of ARMI employees and contractors. ARMI anticipates this insurance will be in place prior to the approval of this application, and if not that it will have a retroactive coverage date that predates the beginning of ARMI's Learn Everywhere program.

ARMI |BioFabUSA will disclose this insurance coverage to the parents of Learn Everywhere participants upon request.

Additional Information

The applicant is encouraged to include any additional information in this application that further explains their program and how it will meet the needs of students through the Learn Everywhere program.

Christy Johnson received her BS Degree in biology from Northern Arizona University and her M.Ed in Middle/Secondary biology from Rivier University. She has over twenty years of both informal and formal education experience including teaching all levels of biology from life science to AP biology, ecology, forensics and physical science at the high school level.

Gabrielle Mourousas has an M.Ed in Secondary Education and a B.S. in Zoology from the University of New Hampshire. She has four years of experience teaching biology, ecology and anatomy and physiology to students in grades 7-12 in the Manchester Public School District.

Kathleen Hannabach coordinates community outreach programs and provides teaching and classroom support as needed. She received a BA degree in special education from Kean University, New Jersey. She holds a NH teacher certification with an endorsement in special education.

Karla Talanian serves as the ARMI Chief Education and Workforce Officer. She earned a Bachelor's Degree in Chemistry from Smith College and a Master's Degree in Biotechnology from Worcester Polytechnic Institute, as well as an M.B.A. . Karla came to ARMI from the Mass Bio Educational Foundation, Cambridge, MA, where she created the highly successful registered apprenticeship program that educated and trained technicians to work in the biopharmaceutical industry. She is designing a registered apprenticeship program for ARMI. Applications for training opportunities are planned to be available to high school graduates and the community at large by the end of 2023.

The BioTrek Extended Learning Opportunity (ELO) and the [ARMI | BioFabUSA Micro-Internship](#) offered in collaboration with the Virtual Learning Academy Charter School (VLACS), are offered to inform students about the emerging field of biofabrication, related career pathways, and to supplement and enrich regular academic coursework, particularly biology, anatomy and physiology, and biotech electives.

Students will explore career pathways, entrepreneurship, and the next-generation technologies that comprise the biofabrication industry. Developed by BioFabUSA, the BioTrek programs rest on three pillars:

- a. engagement with **advanced technologies**,
- b. familiarization with the **principals of entrepreneurship**
- c. exposure to the education, training, and **career pathways** that lead into the advanced manufacturing sector.

In collaboration with VLACS, the ARMI |BioFabUSA Micro-Internship, an accelerated version of the BioTrek program, will be offered as an after school or summer Extended Learning

Opportunity (ELO) for credit. Students may also choose to participate in the BioTrek Extended Learning Opportunity through their school ELO program.

Students will:

- a. Learn about the science, manufacturing, and career opportunities in regenerative medicine and biofabrication.
- b. Identify a real-world medical problem that can be addressed through tissue engineering and biofabrication.
- c. Conceptualize a tissue engineered medical product (TEMP) that attempts to solve the problem.
- d. Design a business model to quantify, finance, and market the TEMP
- e. Explain the problem, the product, and business model concept to a panel of professionals in a final pitch event.

The Micro-Internship program will offer 0.25 credit for career exploration pursuant to **Section Ed 306.35** - Career Education Program.