

Contact: Rachel Boon

REQUEST FOR NEW PROGRAM AT THE UNIVERSITY OF NORTHERN IOWA: BACHELOR OF SCIENCE IN MATERIALS SCIENCE & ENGINEERING TECHNOLOGY

Action Requested: Consider approval of the request by the University of Northern Iowa for a Bachelor of Science in Materials Science & Engineering Technology in the College of Humanities, Arts & Sciences.

The Council of Provosts and Board office support approval of this program.

Description of proposed program. The proposed Bachelor of Science (BS) in Materials Science Engineering Technology will be offered in tandem with a proposed BS in Materials Science & Engineering program to provide broad-based access to materials engineering and technology instruction at UNI. The new engineering technology program takes advantage of existing faculty expertise in materials science and engineering in the Applied Engineering & Technical Management, Chemistry & Biochemistry and Physics Departments. The program emphasizes the properties of metals, which is a core strength of the Department of Applied Engineering & Technical Management. The new major requires 74 credit hours, including 39 credit hours that constitute the materials science and engineering core. The remaining 35 credit hours comprise 20 credit hours of math, chemistry and physics foundational courses, a technical writing course (3 credit hours), and 12 credit hours of technical electives. The materials engineering courses in the core will be taught by UNI faculty members with Ph.D. degrees in engineering.

Academic objectives. The objectives of the BS in Materials Science Engineering Technology program are:

- Provide an education in applied materials science & engineering consistent with the highest ABET (formerly Accreditation Board for Engineering and Technology) ETAC (Engineering Technology Accreditation Commission) accreditation standards;
- Prepare students to understand fundamental applied engineering principles with high-quality courses in mathematics, chemistry and physics;
- Provide courses in materials engineering and technology that incorporate discussion of underlying physical and chemical principles as well as applications relevant to current and future industries;
- Engage students in laboratory activities and project work to ensure that they obtain practical and direct experience with engineering design and practice;
- Enhance technical writing skills through detailed reports adhering to professional styles and standards.

Need for program. UNI has a strong program in manufacturing engineering technology that prepares students for a wide variety of engineering-related careers in industry. Prospective students who are interested in materials engineering technology and also attracted to UNI's undergraduate-centered educational environment must either choose manufacturing engineering technology or go elsewhere. In addition, a survey of materials engineering-related employers in Iowa conducted in spring 2022 indicated a high level of interest in graduates of a materials science engineering technology program. It should also be noted that the U.S. Bureau of Labor Statistics (BLS) forecasts that materials engineering-related jobs will grow by 6% over the next decade. Given the increased emphasis on clean energy, national security, and biomedicine, the need for advanced materials and the workers to produce and test them will likely increase significantly over the next 10-15 years, and the BLS growth rate is probably an underestimate. The U.S. government has signaled the importance of advanced materials development through the

Materials Genome Initiative, which is a multi-agency initiative for discovering, manufacturing and deploying advanced materials.

Relationship to existing programs at the institution. The BS in Materials Science & Engineering Technology builds on the existing expertise and facilities UNI has in metal casting and manufacturing technology in the Applied Engineering & Technical Management Department and materials science in the Chemistry & Biochemistry and Physics Departments. There is currently no major in materials engineering technology. Thus, the proposed program will not duplicate any other current program at UNI.

Relationship to existing programs at other colleges and universities. There are no undergraduate materials science engineering technology programs in Iowa.

Resources to establish a high-quality program. The equipment, infrastructure and personnel necessary for an engineering program are already present, and the renovation of the Applied Engineering building will enhance the facilities. However, there will be a need for additional faculty to be hired in the Applied Engineering and Technical Management, Chemistry and Biochemistry, and Physics Departments so that sufficient faculty are available to teach the additional students in the engineering courses and to meet additional demand in the science and mathematics courses.

Existing facilities and equipment are sufficient to initiate the program. For example, metal casting and fabrication facilities, chemical analysis instrumentation, and electron microscopes. As the number of students in the program grows, additional equipment and supplies will be needed to maintain the high quality of instruction by providing the larger number of students ready access to equipment and instrumentation. Materials and supplies will be needed for the laboratory courses in the program and the new team-project based Introduction to Engineering course.

UNI has the Metal Casting Center which has excellent facilities for materials preparation and characterization. The Foundry 4.0 Center housed within TechWorks is also part of the university. The new program is designed to utilize the existing expertise in metal materials to provide a distinctive education that will meet the workforce needs of the state of Iowa and industry across the nation. The faculty expertise in materials science in the Chemistry & Biochemistry and Physics Departments will provide an interdisciplinary perspective that will prepare students to excel in different materials engineering technology environments.

Student demand. It is expected that the demand for new materials to increase beyond current predictions to meet the needs of industries involving clean energy, national security, and biomedicine over the next two decades. Thus, student demand will likely be modest initially, driven by the needs of local and regional manufacturing firms. Demand should increase considerably over the longer term as more manufacturing capacity shifts back to the U.S. and as clean energy and other future-oriented industries become more dominant.

Engineering technologists are retiring at an increasing rate nationwide due to the aging of the workforce. Increased capacity for training new people to fill these positions is needed. It is anticipated that a fraction of the students who would have enrolled in the existing manufacturing engineering technology program will instead enroll in the new materials science engineering technology program.

Given the very receptive response of employers to the proposed program, new students who are interested in enrolling in engineering technology programs will be attracted to this program. It is anticipated that community college students with associates degrees (especially A.S. degrees) will be attracted to the new program.

Workforce need/demand. U.S. Bureau of Labor Statistics (BLS) forecasts that materials engineering-related jobs will grow by 6% nationally over the next decade (2021–31), which is the average growth for all professions. We expect that this growth will increase because of future demand for clean energy and national security-related technologies. Advisory Board members for the Applied Engineering & Technical Management Department were surveyed before the creation of the proposed program. The board members are employees of industry partners in Iowa.

Respondents were very supportive of a new materials science engineering technology program that emphasizes metals and metallurgy. They indicated that there is a need for engineers and technicians with skills in these areas. They also indicated that internship opportunities should be available at several local metals-focused manufacturing and processing firms.

Funding and Cost. The major equipment needed to start the program is already in place. Departmental and college reallocations will allow the necessary supplied to be purchased. We expect to apply to funding sources such as the Roy J. Carver Charitable Trust for funding for additional major equipment after the proposed program has begun admitting students.

Projected student enrollment.

	Y1	Y 2	Y3	Y4	Y5
Undergraduate	10	20	30	40	50

Accreditation. The program will apply for accreditation under ABET. Once the program has graduated a student it can apply for accreditation.

Date of implementation. Fall 2023.

Letters of Support



May 22, 2023

To the Board of Regents:

The Council of Provosts discussed the University of Northern Iowa proposal for a Bachelor of Science in Materials Science Engineering Technology and reviewed associated documentation. There is sufficient evidence for the benefits of this program the University of Northern Iowa, as well as workforce benefit in the state of Iowa and throughout the Midwest. It will rely on existing faculty expertise in Applied Engineering & Technical Management, Chemistry & Biochemistry, and Physics. The plan indicates due diligence, significant engagement with employers and stakeholders at other Iowa universities. Based on the evidence and documentation, this program is likely to benefit the University of Northern Iowa and the state of Iowa.

The Council of Provosts is supportive of the program and wishes UNI the best in its implementation.

DocuSigned by:
Jonathan Wickert
66186D7527534E0...

5/22/2023

Jonathan Wickert
Sr. Vice President and
Provost

DocuSigned by:
Kevin Kregel
E2CB1E4CA5D34F3...

5/22/2023

Kevin Kregel
Exec. Vice President and
Provost

DocuSigned by:
Jose Herrera
0E4B9A1870CF4F5...

5/22/2023

José Herrera
Exec. Vice President and
Provost

