



Certificate Program in Advanced Manufacturing & Integrated Photonics

Thomas and Donna May School of Arts & Sciences

Photonics, the study of light-based technology and other applications of optical science, is rapidly expanding. But the supply of qualified workers is inadequate to fulfill industry hiring needs, particularly personnel involved in assembly, quality control, testing, repair and technical work.

The Advanced Manufacturing & Integrated Photonics Certificate — offered by the Stonehill-Bridgewater Partnership for Integrated Photonics in collaboration with MIT's AIM Photonics Academy — is 15 months long, emphasizes hands-on experience, and is aimed at rapidly preparing students for immediate employment upon finishing.

BACKED BY THE U.S. OFFICE OF NAVAL RESEARCH

The Certificate program offered by the Stonehill-Bridgewater Partnership for Integrated Photonics is supported by a \$770,000 sub-grant as part of a \$1.8 million grant from the U.S. Office of Naval Research to AIM Photonics Academy at the Massachusetts Institute of Technology.

PROGRAM BENEFITS

- Complete part-time program in as little as four semesters
- Gain skills that increase marketability in other technical fields, e.g. robotics, electronics and materials
- Attend both Stonehill College and Bridgewater State University (BSU), known for advanced optics and photonics labs
- Learn in a cutting-edge optics and photonics lab with equipment used in industry — including a femtosecond laser
- Experience the unique MIT boot camp over the course of several one-day field trips

PROGRAM OUTCOMES

- Design components for semiconductor and optical devices
- Design efficient fabrication processes
- Gain competency in problem solving, technical communication and safety in photonics and optics technician workplace
- Gain knowledge of electronics (basic theory and applications including measuring and testing) in the photonics and optics technician workplace
- Learn to define a photonics project or problem clearly
- Learn to conduct applied work in a timely fashion
- Learn to communicate the results of a project



STONEHILL COLLEGE

Advanced Manufacturing and Integrated Photonics

“Our students are already working in the field across Massachusetts, including exciting start-up ventures. Here, you get the hands-on experience and know-how in everything you will need to gain well-paid positions in the fast-growing photon- and light-based economy.”

Ed Deveney, professor of physics, Bridgewater State University

SAMPLE COURSES

INTRO TO ADV. MANUFACTURING & PHOTONICS

This course gives an overview of modern photonic manufacturing processes and covers necessary background material for subsequent courses. The course includes several visits to MIT for photonic manufacturing “boot camp” days that involve demonstrations and hand-on experiences introducing a sampling of advanced topics.

TOOLS AND MATERIALS FOR ADVANCED MANUFACTURING AND PHOTONICS

This course, which includes lab, online and in-class components, provides a hands-on introduction to the mechanical and thermal aspects of materials and mechanical systems, including belt drives, gear systems and hydraulic control systems. Also covered are the mechanical, thermal and electromagnetic properties of materials relevant to photonic systems and photonic fabrication processes.

STATISTICAL PROCESS CONTROL IN PHOTONICS AND AUTOMATION

This course focuses on the principles of data analytics, automation and process control. These principles will be practiced through exercises and lab work that will introduce the student to working with semiconductor wafers, clean rooms, lithography and pumping systems.

PHOTONIC INTEGRATED CIRCUITS

This course is an introduction to the basic concepts and methods of integrated photonics. Integrated photonics integrates the optical components: waveguides, waveguide bends, Y branch, grating couplers, interconnect and detectors, among others. This course will teach students how to design, fabricate and test an integrated photonic circuit and conduct a data analysis cycle, and will include the design and testing of an integrated circuit as a final project.

PHOTONICS APPRENTICESHIP

This course will consist of a summer apprenticeship at a company, gaining experience in optics- or photonics-related work. Coming in the final semester of the photonics technician certificate program, the student will gain practice at applying the skills learned in previous courses and will develop workplace experience and industry contacts, in preparation for seeking permanent employment at the end of the program.

PHOTONICS CAPSTONE

Students will apply photonics and optical technician training in a capstone project of their choice, studying a problem or application of personal interest. Students are responsible for completing brief written descriptions of their work and making oral presentations to the photonics faculty.

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