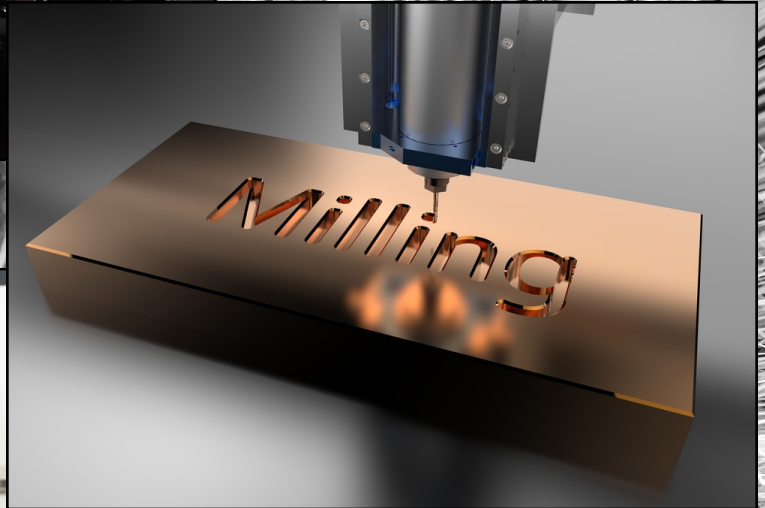
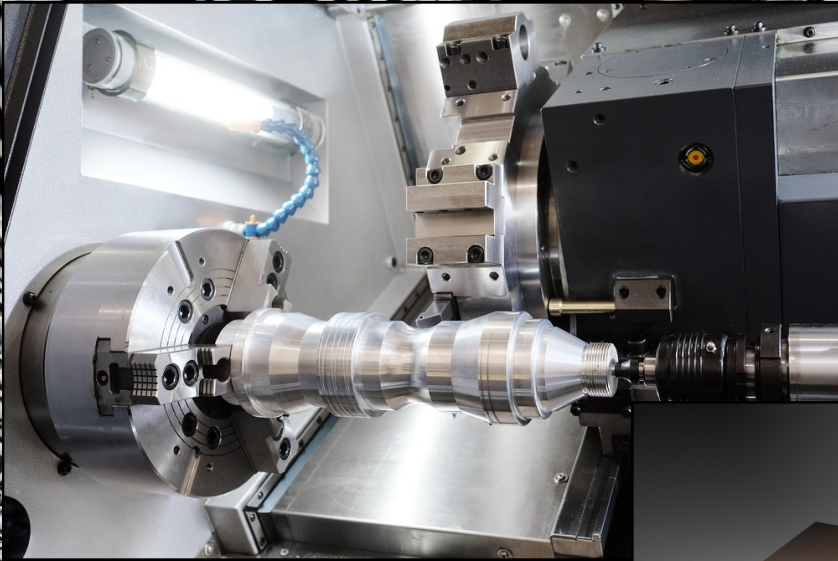




Advanced Manufacturing & Fabrication Program Medford Campus



Advanced Manufacturing Careers Include:

Computer Technicians
Engineers
Inspectors

Production Supervisors
Marketing Specialists
Machinists

www.bcit.cc



Overview

All careers in Advanced Manufacturing require students to have a strong mechanical ability, specialized skills, communication skills and computation skills. Students will be required to apply problem solving, make decisions, and work in a team environment. Preparation for careers in Advanced Manufacturing must begin in the elementary grades and continue through high school, allowing students to gain experience in applied, real-time manufacturing situations.

Students will also find it advantageous to participate in a career and technical program that will expand skills in specific jobs that meet the requirements of the employer. There are excellent opportunities in Advanced Manufacturing where technology and career pathways provide for satisfying careers. The BCIT Advanced Manufacturing & Fabrication program is designed for a smooth transition into a post-secondary certificate and/or degree program.

“Manufacturing accounted for \$1.87 trillion in 2012 - 11.9% of U.S. gross domestic product.”

-National Assoc. of Manufacturers

New Jersey is a leader in manufacturing electronics, chemicals and foods.

The growing sub-sector of advanced manufacturing

1. Tops the list of key and emerging industries in many states;
2. Uses cutting-edge technology and processes to make products that are high-tech and unique;
3. Requires highly skilled workers;
4. NJ manufacturing productivity has grown about 3.8% each year, 2.6 percentage points higher than non-manufacturing annual growth;
5. Many manufacturing jobs are among the highest paid jobs in NJ, averaging over \$80,000 a year.

“Manufacturing provides about one in six private-sector jobs and pays family-sustaining wages.”

-National Assoc. of Manufacturers

Advanced Manufacturing & Fabrication



According to the Fabricators and Manufacturers Association International, "Manufacturers simply cannot find the skilled labor needed today to handle the kinds of sophisticated production processes and tasks required on the manufacturing shop floor."

High Wage/High Demand Career

Prepare now for a career as a manufacturing professional.

- Average hourly pay is about \$24 an hour, commensurate with experience and credentials.
- Prepare for this career while in high school.
- Your BCIT education includes an opportunity to work in the field through our School To Work Program during your senior year.

National Institute of Metalworking Skills (NIMS) credentials certify an individual's skills as measured against NIMS Standards. Earning credentials requires a performance project and a theory test. The projects and theory tests are drawn directly from the NIMS Standards, and are written and piloted by industry.



National Institute for Metalworking Skills®

Students may earn the following NIMS credentials:

Level I Machining Skills

- Manual Milling
- Drill Press Operations
- Surface Grinding
- Manual Turning – Chucking
- Manual Turning – Between Centers
- CNC Milling: Programming, Setup and Operations
- CNC Milling: Operations
- CNC Turning: Programming, Setup and Operations
- CNC Turning: Operations

Level II Machining Skills

- Cylindrical Grinding
- CNC Lathe Operations
- Wire EDM Operations

“Manufacturing in NJ is a \$38 billion industry.”



Course Descriptions



Advanced Manufacturing & Fabrication Exploratory

A ten (10) day exploratory program during the 1st Marking Period designed to introduce students to the field of Advanced Manufacturing and Fabrication.

Introduction to Manufacturing & Safety

This course is an introduction to manufacturing with specific instruction to facilitate safe work practices in industry. It introduces students to mechatronics, precision machining and welding.

Quality Control & Machine Tool Math

This course will cover all of the aspects of Lean Manufacturing. Topics will include line balancing, batching versus single piece flow, standard work, inventory control models, value stream mapping, 5-S, and waste elimination. Students will learn tools for identifying and reducing waste such as fishbone modeling, brainstorming techniques, "spaghetti" mapping, and observation techniques. An emphasis on quality control and people empowerment will be stressed throughout the course.

Manufacturing Processes

This course will cover a qualitative and quantitative study of manufacturing processes. Fundamental principles of value-added processing of materials into useable forms for the customer will be covered. Topics will include material properties and traditional and nontraditional manufacturing processes with an emphasis on process selection for optimum design with quality, strength and economic evaluations.

Machine Processes I & II w/Lab

This course will present the theory of machine processes through lectures and lessons covering traditional, manually operated machine tools such as band saws, drill presses, milling machines and lathes. Topics covered are selecting the machine stock, proper squaring a block on a milling machine, basic layout, drilling, tapping reaming, countersinking, counter boring, chamfering, machine set-up, grooving, and threading. Additionally, students will learn about standard precision measuring tools such as but not limited to micrometers, dial calipers, and Vernier scales with an introduction to gauging, tolerancing, and dimensioning. Machine tool and shop safety will be covered throughout the course.

Intro to CAD/CAM

This course covers Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM). The course includes demonstrations as well as hands-on experience with CAD/CAM software and hardware. An emphasis is placed on geometry creation and editing functions, process planning, proper cutter selection, speed and feed selection, and tool path generation along with post processing to CNC machines. Students need a basic knowledge in drafting/design, machine processes and procedures, and computer operating systems (MS Windows).

Introduction to Manufacturing Maintenance

Students will have the opportunity to develop the skills necessary to maintain and use highly technical advanced manufacturing equipment. This includes but is not limited to CNC Milling Machines and Lathes, drill presses, and welding machines.

CNC Lathe Operation & Programming

In this course, students will expand on CAD/CAM knowledge. CNC Machine Topics will include machine speeds and feeds, feed rate and cycle time optimization. Students will also learn alternative drilling cycles, subprograms, cutter compensation, and scaling/mirroring. CNC Machine safety will be stressed throughout this course. Students will also be introduced to topics including part geometry, CAM-Mill processes, contouring, cycle time estimation, tool selection, material selection, cutter compensation, parameter pages, contour applications, roughing, finishing, and tool paths.

CNC Mill Operation & Programming

Students will be introduced to the fundamentals of Computer Numerical Controlled Milling machines and their programming. First covered in this course is the basic operation of CNC machines with topics such as safety, simulation, tooling with tool selection, and machine zeroing. Hands-on training via simulation will expose the student to absolute and incremental positioning, circular interpolation, program interpolation and cycle pausing. CNC Machine safety will be stressed throughout this course.

Blueprint Reading & Solid Modeling

Students will learn the fundamentals of blueprint reading including multiview drawings, basic dimensioning, holes, fasteners, assemblies, and tolerancing. Solid modeling software will be introduced with training of sketch demands, extruded boss/base features, drawing planes, fillets, chamfers, multiview drawings and dimensioning. Three dimensional assembly modeling will also be covered with emphasis on advanced mates, exploded views and animation.

Advanced CNC Machine Processes

This course expands on the machining skills presented in the CNC Lathe & Mill courses. This course will include 3-D and solid modeling, programming, machine setup and operating procedures. Tool selection, quality measurement/control and operator maintenance are also topics covered.

Properties of Materials

This course introduces the student to the processes and materials used in modern manufacturing, with an emphasis on steels and nonferrous metallic alloys. After establishing the sources of stock materials and the means to modify them to adjust material properties, the selection of why certain materials are appropriate for different applications is covered. The understanding of manufacturing processes is central to the course, including machine tooling, hot working, cold working, casting, joining processes and powder metallurgy. In addition, the processes required to manufacture plastics and composites will also be incorporated.

Welding Technology I

This course is designed to enhance the knowledge, skills and attitudes in Shielded Metal Arc Welding (SMAW) in accordance with industry standards. It covers core competencies such as Setting-up of Welding Equipment, Preparing Weld Materials, Fitting up Weld Materials, Welding Carbon Steel Plates using SMAW Process and Repairing welds.



**Proposed sequence*

9th Grade

Semester 1	Semester 2
English I*	PE/Health I
Algebra I*/Algebra II*	US History I*
STEM/Biology*	Art
Advanced Manufacturing & Fabrication Exploratory (MP1)	Quality Control & Machine Tool Math (MP3)
Introduction to Manufacturing & Safety (MP2)	Manufacturing Processes (MP4)



10th Grade

Semester 1	Semester 2
Machining Processes I w/Lab	Machining Processes II w/Lab
Introduction to CAD/CAM	Biology/Chemistry*
English II*	PE/Health II
Algebra II*/Geometry	US History II*



Summer Online
Financial Literacy

* Honors or College Preparatory available

11th Grade

Semester 1	Semester 2
Introduction to Manufacturing Maintenance	CNC Lathe Operation & Programming
Spanish I*	CNC Mill Operation & Programming
English III* or AP English Composition	PE/Health III
Chemistry/AP Chemistry/Physics	Geometry*/ Pre-Calculus*



12th Grade

Semester 1	Semester 2
English IV* or AP English Literature	PE/Health IV
World History* or AP World History	Spanish II*
Blueprint Reading & Solid Modeling	Properties of Materials
Advanced CNC Machine Processes	Welding Technology I



CNC Milling Machine

Burlington County Institute of Technology

Medford Campus

10 Hawkin Road, Medford, NJ 08055

For more information, contact BCIT Admissions

(609) 267-4226, Ext. 8245

www.bcit.cc