

COURSE INFORMATION

COURSE PREFIX/NO: **MTT 175**

COURSE TITLE: **Innovations in Machining Technology**

LEC HRS/WEEK: 2.0

LAB HRS/WEEK: 3.0

CREDIT HRS/SEMESTER: 3.0 [DL ATTENDANCE/VA STATEMENT](#) [TEXTBOOK INFORMATION](#)

COURSE DESCRIPTION:

This course serves as a comprehensive survey in the area of Industrial Laser Technology. The course provides a detailed examination of the characteristics of laser light, laser safety, laser system components, types of lasers, and laser applications. The course also provides students with the knowledge and skills necessary to program and operate an industrial laser machining system. Particular emphasis is placed on the design and manufacture of a significant product by each student using CAD/CAM and Laser Technology.

COURSE COMPETENCIES:

Upon successful completion of this course, the student shall be able to:

- define laser technology and describe its role in modern industrial and manufacturing settings.
- describe the nature of light and contrast the properties of laser light with those of ordinary light.
- define the radiometric measurements associated with the measurement of light.
- describe typical applications in which lasers have been utilized effectively.
- identify the components of a laser system.
- identify safety issues that should be considered when implementing laser technology.
- describe factors to consider when evaluating laser technology for potential application.
- identify the major costs associated with an industrial laser machining operation.
- describe the advantages/disadvantages of laser technology in various manufacturing applications.
- identify the primary/secondary considerations in laser processing of materials.
- describe how laser technology will help domestic manufacturers become more competitive in the future.
- demonstrate the procedure to start-up and shut-down an industrial laser machining system.
- demonstrate proper safety during laser operations.
- evaluate a new material for suitability for laser processing, and determine appropriate laser parameters for material processing.
- develop and run a manually generated program.
- create design drawings using AutoCAD (with minimal assistance depending upon student's background).
- convert AutoCAD design files to the format necessary for driving laser machining system.
- download programs from a personal computer to the controller of the industrial laser machining system.
- adjust and operate laser machining system (in a supervised environment).

MINIMAL STANDARDS:

Given lectures and reading assignments, the student will be able to complete all written competency tests with a minimum accuracy of 75%.

Given lectures, reading assignments, demonstrations and laboratory exercises, the student will be able to complete skills tests with a minimum accuracy of 75%.

Given lectures, reading assignments, and demonstrations, the student will be able to complete assigned laboratory and project activities with a minimum competence of 75%.

The student will exhibit an acceptable level of professionalism during all class activities. The student will be concerned with and apply proper safety procedures during all class activities. The student will ensure that all class work is completed in a timely manner.

COURSE REQUIREMENTS:

The student is responsible for attaining the course competencies by completing the following course requirements:

- attending class
- reading all assigned material and handouts
- completing written requirements and homework
- participating in class discussions
- completing all competency tests
- completing all assigned laboratory or project activities

ATTENDANCE POLICY

This course is governed by the school attendance policy as set forth in the York Technical College Handbook. When a student is to be absent from class on a day on which a test or other graded exercise is to take place, he/she must receive approval for a make-up from the instructor before the day in question. The missed graded activity should be made up as soon as possible after returning to class.

The conduct of this course attempts to parallel, as much as practicable, the professional environment found in industry. Therefore, repeated lateness to class will be treated as unacceptable participation and will have a detrimental effect on the student's final course grade.

ACADEMIC INTEGRITY

The policies set forth in the York Technical College Handbook will be enforced in this course. Furthermore, the student will be treated as a professional and will be expected to act accordingly.

EVALUATION AND GRADING:

The final grade for this course will be determined by combining individual scores in the following:

- written competency exams (2) 30%
- skills tests 30%
- laboratory/project activities 30%
- participation 10%

The grading scale for the course is as follows:

Grade Score

- A 90-100
- B 80-89
- C 70-79
- D 60-69
- F below 60

ENTRY-LEVEL SKILLS:

There are no special skills required for entrance into this course; however, knowledge in the area of electronics and elementary computer programming would prove beneficial.

Prior experience with AutoCAD or other CAD software is also helpful.

PREREQUISITES:

None

CO-REQUISITES:

None

TOPIC/CONTENT OUTLINE:

- * The Nature of Light
- * Properties of Laser Light
- * History of Laser Development
- * Radiometric Measurements
- * Introduction to Laser System Safety
- * Physics of Light Generation
- * Elements of a Laser
- * Laser Output Characteristics
- * Major Types of Lasers
- * Laser System Components
- * Laser Optics and Beam Delivery
- * Laser Applications - General
- * Industrial Laser Applications
- * Laser System Justification
- * Laser System Operating Costs
- * Laser System Safety
- * Laser System Integration
- * Material Suitability for Laser Processing
- * Laser System Costs
- * Laser System Maintenance
- * Competing Non-traditional Manufacturing Processes
- * Lasers in JIT Manufacturing and CIM
- * Laser Application Case Studies
- * Primary/Secondary Considerations in Laser Processing
- * Laser Suppliers and System Availability

LABORATORY EXERCISES:

- * Laser System Start-up and Shut-down
- * Laser Safety
- * Laser System Parameters
- * Laser Beam Focus
- * Interpretation of Manual Program
- * Developing/Running Manual Program
- * Downloading and Uploading Programs
- * Designing Products using AutoCAD
- * Converting CAD Files
- * Laser Parameter Selection

INSTRUCTIONAL METHODOLOGY:

This course will consist of a blend of instructional methods to include lectures, class discussions, demonstrations, individual/team project assignments and industry field trips. Various media forms will be used in the classroom including overhead transparencies, slide presentations, chalk/white boards and videotapes. Reading assignments will be in the form of handouts provided by the instructor.