



## Introduction to Industrial Maintenance

PEIMS Code: N1303688  
Abbreviation: INTINMAT  
Grade Level(s): 10-12  
Award of Credit: 1.0

### Approved Innovative Course

- Districts must have local board approval to implement innovative courses.
- In accordance with Texas Administrative Code (TAC) §74.27, school districts must provide instruction in all essential knowledge and skills identified in this innovative course.
- Innovative courses may only satisfy elective credit toward graduation requirements.
- Please refer to [TAC §74.13](#) for guidance on endorsements.

### Course Description:

*Introduction to Industrial Maintenance* allows students to acquire knowledge in industrial maintenance principles. The course will provide an overview that includes tools and fasteners pertinent to the industry. Students will engage in industrial print reading, rigging, lubrication, gears, bearings and seals along with basic electrical circuits and fluid power. Students will identify safety, health and environmental maintenance and troubleshooting within industrial maintenance.

### Essential Knowledge and Skills:

- (a) General requirements. This course is recommended for students in grades 10-12. Recommended prerequisite: Construction Technology I. Students will be awarded one credit for successful completion of course.
- (b) Introduction.
  - (1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current and emerging professions.
  - (2) The Manufacturing Career Cluster focuses on planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering.
  - (3) Introduction to Industrial Maintenance allows students to acquire knowledge in industrial maintenance principles. The course will provide an overview that includes tools and fasteners pertinent to the industry. Students will engage in industrial print reading, rigging, lubrication, gears, bearings and seals. Students will identify safety, health and environmental maintenance and troubleshooting within industrial maintenance.

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- (4) Students are encouraged to participate in extended learning experiences such as participation in career and technical student organizations and other leadership or extracurricular organizations.
  - (5) Statements that contain the word “including” reference content that must be mastered, while those containing the phrase “such as” are intended as possible illustrative examples.
- (c) Knowledge and Skills.
- (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:
    - (A) discuss and describe the roles, responsibilities, and dynamics of teams as applied in manufacturing careers;
    - (B) explain employers’ work expectations;
    - (C) demonstrate knowledge of the concepts and skills related to health and safety in the workplace as specified by appropriate governmental regulations such as Occupational Safety and Health Administration (OSHA);
    - (D) research and describe the trends of careers within the manufacturing industry; and
    - (E) identify safety, health, environmental, and ergonomic issues in manufacturing.
  - (2) The student understands the uses, proper handling, and storage of tools used in industrial maintenance. The student is expected to:
    - (A) identify tools such as gantries, probes, pressure gauges, and voltmeters used in industrial maintenance;
    - (B) demonstrate proper usage of tools used in industrial maintenance;
    - (C) explain proper handling and safety of tools used in industrial maintenance; and
    - (D) properly store and inventory tools used in industrial maintenance.
  - (3) The student identifies terminology and fundamental concepts of fasteners used in manufacturing. The student is expected to:
    - (A) identify the different types of fasteners used in industrial maintenance such as screws, bolts nuts, grades of fasteners, taps and dies, and torque specifications;
    - (B) explain the proper usage of fasteners in industrial maintenance; and
    - (C) practice proper safety using fasteners in industrial maintenance.
  - (4) The student identifies terminology and fundamental concepts of lubricants in industrial maintenance. The student is expected to:
    - (A) identify the different types of lubricants used in industrial maintenance, including grades of lubricants, oil viscosity, oil weights, whether they are petroleum based or vegetable oil based, and the use of oil additives;
    - (B) demonstrate proper application of lubricants such as submersion, splash, wick, drip, and automatic oiler methods;

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- (C) prepare proper lubrication schedules for maintenance on each type of machine, bearing, and seal; and
  - (D) maintain proper record keeping for Material Safety Data Sheets (MSDS) logs in the event of an emergency.
- (5) The student identifies terminology and fundamental concepts of gears, bearings, and seals used in manufacturing. The student is expected to:
- (A) identify the various seals, gears, packing, and bearings used in industrial maintenance;
  - (B) identify the various packing materials used in industrial maintenance such as twisted fiber, square braided, braid over braid, and interlocking packing;
  - (C) describe the proper installation of seals;
  - (D) identify the various types of bearings such as sealed antifriction, ball bearings, radial thrust bearings, and ball-thrust bearings;
  - (E) define radial, axial, and radial and axial loads for bearing;
  - (F) name the different parts of a bearing;
  - (G) demonstrate correct installation and removal of bearings; and
  - (H) identify and troubleshoot various reasons for bearing failure.
- (6) The student identifies terminology and fundamental concepts of industrial print reading used in manufacturing. The student is expected to
- (A) interpret dimensional drawings;
  - (B) interpret the schematics of drawings;
  - (C) identify the key parts or components in drawings and demonstrate how to use the border system;
  - (D) interpret an exploded view drawing; and
  - (E) identify the four basic types of drawings: the single line drawing, the pictorial diagram, the schematic diagram, and the ladder diagram.
- (7) The student identifies terminology and fundamental concepts of rigging as used in manufacturing. The student is expected to:
- (A) use correct formulas to perform weight estimations;
  - (B) demonstrate proficiency in balancing weight loads;
  - (C) understand terminology pertinent to the usage of slings;
  - (D) identify the different type of slings, pullies, and ropes used in manufacturing industries, including natural and synthetic;
  - (E) identify the different types of wire rope classifications;
  - (F) identify the different types of chains used when rigging;
  - (G) inspect and select proper equipment needed to make a safe lift; and
  - (H) perform pre-lift planning.
- (8) The student understands the importance of maintenance within manufacturing. The student is expected to:

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- (A) document and implement preventive and predictive maintenance methods for manufacturing environments;
- (B) correctly diagnose repairs in manufacturing systems;
- (C) predict maintenance issues;
- (D) troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision;
- (E) develop and implement maintenance schedules; and
- (F) identify the most common causes of failure of equipment in order to diagnose problems quickly.

### Recommended Resources and Materials:

Brumbach, Michael E. and Claude, Jeffrey A. (2014). Industrial Maintenance. 2<sup>nd</sup> Edition. Boston. Cengage.

Festo Didactic Staff. (2015) Rigging Learning Systems. Quebec, Canada: Lab Volt Ltd.

Festo Didactic Staff. (2015) Mechanical Training Systems. Quebec, Canada: Lab Volt Ltd.

### Recommended Course Activities:

- Design and construct basic maintenance schedules for lubrication
- Design and construct basic drawings for exploded views of gears and pulleys
- Design and construct basic pre-lift planning process for rigging
- Design and construct fastener board identifying fasteners and their uses
- Design basic maintenance schedules for 4-6 pieces of equipment

### Suggested methods for evaluating student outcomes:

- Performance on assigned projects
- Teacher- developed assessments
- Evaluations on skill competency
- Tests
- Daily grades
- Grades on groups projects using rubrics

### Teacher qualifications:

An assignment for Introduction to Industrial Maintenance is allowed with one of the following certificates.

- Secondary Industrial Arts: Grades 6-12.
- Secondary Industrial Technology: Grades 6-12.
- Trades and Industrial Education.
- Vocational Trades and Industry with appropriate work approval.

### Additional information: