

IST - INDUSTRIAL SYSTEMS

IST 100 Introduction to Industrial Systems Technologies

This is a hands-on introductory course intended to acquaint students with basic skills and knowledge required as a part of the Industrial Systems Technology program. This course is specifically designed to provide knowledge and skills required for installing, maintaining, and replacing various process equipment and systems. Specific instruction in this class will cover moving and rotary equipment including terminology, function, components and purpose. Heavy emphasis will be placed on drives, belts, chains, gears, couplings, alignment, lubrication, packing and seals. Safety practices and procedures regarding the use of hand and power tools for equipment installation, repair and replacement will be stressed. The proper use of equipment and installation manuals and standards will be addressed. This course is recommended for students who have little or no industrial equipment experience.

Upon successful completion of this course, students should be able to:

Identify motion equipment such as conveyors, pumps, drives, gears, etc. Select and install appropriate fasteners such as nuts, bolts, snap rings, pins, etc.

Describe the primary function of motion equipment as it relates to a manufacturing or an industrial processing system.

Describe and demonstrate various methods of shaft alignment.

Research and explain manufacturer's specifications, ie, installation, operation, maintenance, service and repair.

Define the criteria for measurement, usage, and application of various measuring instruments commonly found in industrial facilities.

Interpret and use Process and Instrumentation Diagrams (P&ID's) for various pieces of mechanical equipment, to include instrumentation, piping and other devices.

Describe equipment maintenance with regard to planning, scheduling, selection of parts, power and hand tool requirements with a strong emphasis on environmental, accident prevention, and health issues.

Select the proper tools, equipment and instruments to install/align a drive unit and coupling.

Compare and contrast belt, chain and gear drives.

Calculate various drive ratios for speed and torque.

Classify industrial drive systems and their applications.

Utilize manufacturer's specifications to determine replacement parts.

Analyze lubrication and packing seals to assure appropriate equipment performance.

Plan, schedule and employ practical preventive maintenance for various pieces of equipment as part of an industrial system.

Prerequisites: MTT 108* and TME 115* MAT 050 and ((ENG 050 and REA 050) or ENG 099* or REA 075). Successful College Placement Test Scores may be accepted. (*Courses may be taken concurrently.)

3 Credits3 Weekly Lecture Hours

IST 101 Industrial Drive Systems

This course is designed to present the theory and practical applications associated with industrial drive systems. Specific instruction will be placed on the demonstration of knowledge and skills required of an Industrial Systems Technician. Students will learn how to analyze, operate, install, troubleshoot and maintain various mechanical systems utilizing belts, chains and drive shafts, and associated components such as bearings, seals, gears, couplings, sprockets, keys and linkages. Heavy emphasis is placed on mechanical drive arrangements where practical solutions are required. Students will also become familiar with drive units and speed control systems.

Upon successful completion of this course, students should be able to:

Describe the terminology, design, function, and components of both belt and chain driven systems.

Explain the function of cogged belts, and synchronous belts and their benefits.

Compare the varied types of drive and speed control systems used in industry.

Define various types of chain lubrication methods, and demonstrate how to maintain each.

Compare various types and applications of gear drives and their applications.

Perform calculations involving ratios, shaft speed, and torque for a gear train drive system.

Describe the function of chain drive components within various types of chain drive systems, and specify a system for a given application.

Select the appropriate belts, pulleys, chains and sprockets for a specific system installation.

Describe the function, operation, safety features, lubrication, and maintenance requirements of a material handling conveyor system.

Calculate pulley ratios as well as shaft speed and torque associated with a belt drive system and determine belt deflection for a given application.

Calculate conveyor belt length and linear speed using multi-methods.

Conduct job planning and perform routines to include lockout and tag out procedures for varied pieces of industrial process control equipment.

Install and align a conventional v-belt drive system, a multi-belt drive system and describe the methods for measuring belt tension.

Remove and install a chain sprocket and set chain sag for a given application.

Demonstrate the installation and alignment of a single, and a multiple chain drive system.

List various coupling design categories, and demonstrate coupling alignment using rim, face indicator methods.

Specify, install, operate, troubleshoot and maintain a flat belt conveyor system.

Start-up and operate a manually controlled processing system, an open loop control system, and a closed loop control system.

Troubleshoot belt drive, chain, and coupling systems.

Prerequisite: IST 100 and IST 105* and TME 115*. (*Courses may be taken concurrently.)

3 Credits2 Weekly Lecture Hours

2 Weekly Lab Hours

IST 105 Industrial Systems Drawings

This introductory course in blueprint reading prepares students to interpret mechanical, electrical and commercial architectural drawings and plans. Students learn about the different types of graphic representations in the electrical, mechanical and commercial construction trades, as well as how these drawings are related to the job requirements of an Industrial Systems Technician. The course will cover mechanical drawings, orthographic projections, dimensioning, use of symbols, wiring and control diagrams, piping and electrical distribution systems, and commercial construction building site plans. Emphasis will be placed on the understanding, interpretation, and application of drawings.

Upon successful completion of this course, students should be able to:

Define the purpose and use of symbols as well as the terminology associated with industrial system drawings.

Relate the meaning of line types, dimensions, views and sections, orthographic projection, notes, etc.

Describe mechanical details, components, and assemblies.

Interpret electrical schematics, to include single line, full wiring, and electrical ladder diagrams.

Decipher building wiring, conductor color coding, phase color coding and termination schemes.

Read drawings of lighting, electrical, and piping distribution systems as well as AC control circuits.

Create and utilize HVAC, wiring, and plumbing schematic diagrams.

Apply schedules, site plans, and construction specifications as part of job planning requirements.

Analyze records, reports and other documentation.

Prepare reference documents as per in-the field installation, repair or replacement requirements.

Conduct material take-off and basic estimating routines utilizing drawings.

Prerequisite: NONE New students should complete Placement Testing prior to registration. Visiting students may submit college transcript.

3 Credits2 Weekly Lecture Hours

2 Weekly Lab Hours

IST 190 Industrial Systems Internship (1 credit)

College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 60 hour internship will earn 1 college credit for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.

Upon successful completion of this course, students should be able to:

Explain three program-related concepts that have been applied during the work experience.

Describe the ways that technology is utilized in the work experience.

Analyze the culture of the host organization.

Analyze an operational process within the work experience.

Demonstrate how assigned tasks depend on successful communication.

Describe how time and activity are managed to meet work-imposed deadlines.

Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.

Demonstrate specifically how job-related competence has improved.

Formulate a self-assessment for career growth and personal satisfaction.

Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).

Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.

1 Credit

IST 194 Industrial Systems Internship (2 credits)

College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 120 hour internship will earn 2 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.

Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.

Describe the ways that technology is utilized in the work experience.

Analyze the culture of the host organization.

Analyze an operational process within the work experience.

Demonstrate how assigned tasks depend on successful communication.

Describe how time and activity are managed to meet work-imposed deadlines.

Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.

Demonstrate specifically how job-related competence has improved.

Formulate a self-assessment for career growth and personal satisfaction.

Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).

Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.

2 Credits**IST 199 Industrial Systems Internship (3 credits)**

College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 180 hour internship will earn 3 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.

Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.

Describe the ways that technology is utilized in the work experience.

Analyze the culture of the host organization.

Analyze an operational process within the work experience.

Demonstrate how assigned tasks depend on successful communication.

Describe how time and activity are managed to meet work-imposed deadlines.

Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.

Demonstrate specifically how job-related competence has improved.

3 Credits

IST 200 Pumping Systems

This course provides students with basic skills and knowledge associated with the theory of industrial pumping systems, to include various pumps and system terminology, classification, specification, identification, installation, operation, troubleshooting and maintenance. Theoretical and laboratory instruction in this course provides students with a complete introduction to pumping system function, selection, sizes, dynamics and applications. Topics of coverage will emphasize flow, pressure, metering, valves, piping, single and multi-stage pumps, as well as inlet and discharge designs. A heavy emphasis will be placed on installation, routine and preventative maintenance, and troubleshooting of systems.

Upon successful completion of this course, students should be able to:

Define and describe the function of a pump, and give an application.

List and define various categories and types of pumps and their applications.

Utilize appropriate terminology associated with pumps and pumping systems.

Explain the dynamics of a pumping system.

Interpret and explain manufacturer's pump specifications and pump curves.

Define pump efficiency and explain its significance to overall system operations.

Describe the function, purpose, and applications of series and parallel pumping systems.

Specify fluid properties relative to pump selection and operation.

Describe the installation of a single stage pump, to include sizing specifications and measurements.

Describe the purpose and proper use of a flow meter.

Calculate flow velocity and describe the relationship between pressure and head.

Explain cavitation in a pump system, as well as corrective actions.

Identify and configure pump motors and drives.

Determine and select measurement instruments, tools, anchors, shims, fittings, valves, piping, and gasket materials required to install a pumping system.

Calculate pump efficiency and make proper adjustments (as applicable).

Describe suction, discharge, and total head and demonstrate the use of pressure and vacuum gauges.

Install a centrifugal pump using manufacturer's specifications.

Identify, specify, and replace packing and mechanical seals.

Start-up, inspect, maintain and troubleshoot a pump.

Prerequisite: ((ENG 050 and REA 050) or ENG 099 or REA 075) and MAT 128 and PHY 107 and TME 115. Appropriate placement test scores may be accepted.

3 Credits2 Weekly Lecture Hours

2 Weekly Lab Hours