GRANDE PRAIRIE REGIONAL COLLEGE
Industrial Training

Industrial Maintenance Technician Program

COURSE SYLLABUS - SEMESTER I

APPLIED MECHANICS I: IM0011

This course is divided into ten units, the first six units will be offered in the first semester. Topics in mathematics and physics will be discussed from a practical perspective with examples from millwright and other related trades. This course is designed to provide students with a firm basis in mathematics and physics which will be applicable throughout their career.

Prerequisites: None
Textbooks: *Trade Mathematics for Machinists and Millwrights,* Northern Alberta Institute of Technology (NAIT)
Scientific Calculator
Class Hours: See Timetable

Review of Basic Mathematics

Prior to the commencement of this course, students will review the following basic mathematical concepts.

- fractions
- percentages
- triangles
- decimals
- formulae transposition
- ratio and proportion
- power roots and order of operations
- measurement (Imperial, metric, angular, taper)

Course Objectives

Unit 1: Linear Motion

Upon completion of this unit, students will be able to:

1. define basic terms used to describe linear motion including: speed, velocity, acceleration, average acceleration, distance, displacement, momentum, scalars, vectors, force, mass, acceleration due to gravity.

2. describe the law of conservation of motion and Newton's three fundamental laws of motion.

3. apply one of four general equations for uniformly accelerated motion to solve basic motion problems.

4. apply equations to solve introductory problems of momentum, force, mass and acceleration.

Unit 2: Force

Upon completion of this unit, students will be able to:

1. define terms related to force including: moment of force, torque, load, effort and mechanical advantage.

2. define the balancing of forces on a beam and be able to state the conditions for equilibrium of beam and lever systems.

3. solve basic problems related to the balancing of beams and levers, including mechanical advantage of a beam.

4. understand mechanical advantage/velocity ratio for: wheel and axle, pulleys, gears, block and tackle.

5. solve problems involving load, effort, mechanical advantage, radii and diameters for: block and tackle and wheel and axle systems.

6. solve problems related to the size and speed of gears and pulleys.

Unit 3: Friction

Upon completion of this unit, students will be able to:

1. define basic terms including: static friction, dynamic friction, coefficient of friction, force of friction and reaction at the normal.

2. solve basic orthogonal friction problems.

Unit 4: Pressure

Upon completion of this unit, students will be able to:

1. define basic terms including: static pressure, atmospheric pressure, gauge pressure, absolute pressure.

2. solve basic pressure problems for solids.

3. understand the relationship between absolute, gauge and atmospheric pressures in both Imperial and S.I. units.

Unit 5: Work and Power

Upon completion of this unit, students will be able to:

1. define the terms of work, power and efficiency.
2. be able to mathematically understand and derive the units for work.
3. understand efficiency in terms of output and input work or pressure.
4. solve basic work and power problems.
5. solve work and power problems for pumps.

Unit 6: Energy

Upon completion of this unit, students will be able to:

1. define terms including: energy, potential energy, kinetic energy.
2. be able to derive the units for energy.
3. describe the different forms of energy.
4. understand the relationship between thermal energy and mechanical energy.
5. understand the relationship between potential and kinetic energy.
6. describe the law of conservation of energy.
7. solve basic problems involving potential and kinetic energy.

Evaluation

The students will be evaluated as follows.

1. Assignments 20%
2. Midterm Exam 30%
3. Final Exam (theory) 30%
4. Quizzes 20%

Attendance

Refer to the Attendance Policy - Progression Criteria