**1. FED 101 – Fundamentals of Engineering Design**

**2. Credits and contact hours**

1.5-1.5-2 (1.5 lecture hr/wk – 1.5 lab hr/wk – 2 course credits)

**3. Course Coordinator or Instructor:** Irina Molodetsky

**4. Textbook**

N/A

**5. Specific course information**

**a. Description:**

This course introduces students to fluid flow concepts used in the design and measurements via complementary lecture and laboratory components. Laboratory experiments on flowmeter calibration, pump characterization and pressure drops in the packed columns are performed and reported by teams of students.

**b. Prerequisites:** N/A

**Co-requisites:** N/A

**c.** **Required, Elective, or Selective Elective** – Required

**6. Specific goals for the course**

**a. Course Objectives:**

1. Teach students about relationship between energy, pressure and fluid flow
2. Introduce students to measurements of the pressure and flowrates, centrifugal pump and packed columns
3. Teach the concepts of calibration, comparison of the predicted and measured property
4. Teach different unit systems and unit conversion
5. Introduce to data analysis and data reporting using modern software

**7. Topics**

1. Instruments and measurements. Accuracy, precision, tolerance, errors.
2. Laboratory safety and engineering ethics
3. Static pressure in liquids. Gauges. Absolute and gauge pressure
4. Energy-Pressure relationship in the fluid.
5. Flowmeters. Design of experiment: calibration of flowmeter
6. Centrifugal pump: Head, efficiency. Energy conservation and energy losses.
7. Flow through the packed column: prediction (Ergun equation) and measurement
8. Scale down flow system: engineering design to meet the requirements