

Fundamentals of Engineering Design
FED 101
2 credits

Class meetings: Wednesday, 8:30-11:25 AM

Room 411 Tiernan Hall (Computer Lab)\Room 206 Tiernan Hall (FED Lab)

Instructor: Dr. Irina Molodetsky

Room 350 Tiernan Hall

Office hours: Monday, 4-5:30pm; Thursday: 3-5:30 pm

Please, contact by email for additional meeting

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What you will learn from taking this course:

- Conceptual understanding of relationship between energy, pressure and fluid flow
- How to build a model flow system containing several major process design elements and understand their operation through measurements of important physical parameters of the system
- Different unit systems and how to perform unit conversion
- Introduction to measurements, data analysis and data reporting
- A method to conduct risks assessment to comply with NJIT safety standards
- Basic skills of technical writing, oral presentation and professional communication
- Working as a team

If you need accommodations due to a disability please contact Chantonette Lyles, Associate Director of Disability Support Services, Fenster Hall Room 260 to discuss your specific needs. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.

Course Syllabus and Schedule

W1	<p>Course Introduction. Energy and mass conservation. Energy-pressure relationship in the flow system Measurements; instrumental uncertainty.</p>
W2	<p>10 minutes quiz #1 Centrifugal pump. Energy conversions in the flow system with a pump. Design of the experiment. Introduction to Visio Safety lecture. Method of risk assessment of the laboratory experiment Lab: Design and construction: pump laboratory experiment</p>
W3	<p>10 minutes quiz #2 Units, Dimension units Introduction to Excel Lab: Construction and measurements: pump laboratory experiment</p>
W4	<p>10 minutes quiz #3 Submit lab report on the pump laboratory experiment Rotameters (principles). Calibration of the flowmeter. Design of Experiment Lab: Calibration of the flowmeter</p>
W5	<p>10 minutes quiz #4 Submit lab report on the flowmeter calibration Packed column concept. Single phase flow through the packed column. Laminar and turbulent flows; Re number. Ergun equation Design of the experiment: pressure drop in the horizontal pipe Lab: Construction of the packed column (horizontal column). Pressure drop measurements</p>
W6	<p>10 minutes quiz #5 Submit lab report on the flowmeter calibration (final, after rework) Submit lab report on the pump efficiency and pressure head (final, after rework) Units and unit conversion Practice test - homework Lab: Construction of the vertical layout. Pressure drop measurements</p>

W7	<p>10 minutes quiz #6</p> <p>Submit a lab report on the pressure drop in the packed column (3)</p> <p>Spray column concept.</p> <p>Demo of the packed column</p> <p>Research papers are distributed for a paper review</p> <p>Practice test - homework</p>
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W8	<p>Requirements document is given to students</p> <p>Schematic of the final flow system design project is distributed</p> <p>Lab: Construction starts</p>

W9	<p>10 minutes quiz #7</p> <p>Prediction of the pressure drop in the packed spray column (two-phase flow).</p> <p>Lab: Construction is completed</p>
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W10	<p>10 minutes quiz #8</p> <p>Research papers reviews are due</p> <p>Modeling and prediction. Introduction to Aspen</p>
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W11	<p>10 minutes quiz #9</p> <p>Team DEMO of the design projects</p>
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W12	<p>10 minutes quiz #10</p> <p>Review of the units and units conversion.</p> <p>Draft ppt presentation – submission of the slides</p> <p>Submission of the paper review</p> <p>Deconstruction</p>
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W13	Meeting with individual teams to give a feedback for submitted ppt slides;
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W14	Final ppt presentations
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