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  
Email: Irina.Molodetsky@njit.edu

**TA: Chris Dobrzanski**  
Room 321A Tiernan Hall  
Email: cdd23@njit.edu

**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

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>W2</td>
<td>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</td>
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<tr>
<td>W3</td>
<td>10 minutes quiz #2 Units, Dimension units Introduction to Excel Lab: Construction and measurements: pump laboratory experiment</td>
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<tr>
<td>W4</td>
<td>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</td>
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<tr>
<td>W5</td>
<td>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</td>
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<tr>
<td>W6</td>
<td>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</td>
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W7 10 minutes quiz #6
Submit a lab report on the pressure drop in the packed column (3)
Spray column concept.
Demo of the packed column
Research papers are distributed for a paper review
Practice test - homework

W8 Requirements document is given to students
Schematic of the final flow system design project is distributed
Lab: Construction starts

W9 10 minutes quiz #7
Prediction of the pressure drop in the packed spray column (two-phase flow).
Lab: Construction is completed

W10 10 minutes quiz #8
Research papers reviews are due
Modeling and prediction. Introduction to Aspen

W11 10 minutes quiz #9
Team DEMO of the design projects

W12 10 minutes quiz #10
Review of the units and units conversion.
Draft ppt presentation – submission of the slides
Submission of the paper review
Deconstruction

W13 Meeting with individual teams to give a feedback for submitted ppt slides;

W14 Final ppt presentations