Mechanical and Industrial Engineering (MIE) Graduate Programs

An Informational Session for New MIE Graduate Students

August 27, 2013
MIE Department Administrators

- **Professor Hanchen Huang**  
  *MIE Department Chair*  
  Office: 334 Snell Engineering  
  email: h.huang@neu.edu

- **Professor Emanuel Melachrinoudis**  
  *MIE Associate Chair and Director of Industrial Engineering Program*  
  Office: 334 Snell Engineering  
  email: emelas@coe.neu.edu
MIE Department At A Glance

- The MIE Department at Northeastern University (www.mie.neu.edu) is ranked among top 50 in the nation.
- 41 full-time faculty among whom there are 2 National Academy of Engineering (NAE) members, 2 National Science Foundation (NSF) Center Directors, and many national/international society level fellows.
- Combined annual research funding of over $10 million.
- 100+ Ph.D. and 300+ MS students, and a total combined graduate/undergraduate student population of over 1500.
- Home to top-ranked cooperative education program.
- Home to multiple federally-funded research centers including:
  - The NSF Nanoscale Science and Engineering Center (NSEC) for High-rate Nanomanufacturing,
  - The NSF Center for Health Organization Transformation,
  - The NSF Center for Microcontamination Control
- Plans to dramatically expand the number of faculty hires across the University, including MIE Department.
MIE Department Staffs (334 SN)

Katherine Swan, Noah Japhet, and Joyce Crain
MIE Graduate Committee Chair

- **Professor Nader Jalili**, 373 SN
  617-373-3629, [n.jalili@neu.edu](mailto:n.jalili@neu.edu)

  - Examples of duties include:
    - Overseeing all graduate committee activities
    - Reviewing all petition requests and approval
    - Administering PhD Qualifying Exams
    - …. 
MIE Department Concentration Areas

- Materials Science & Engineering
- Mechanics & Design
- Mechatronics (coming soon)
- Thermofluids Engineering
- Industrial Engineering
  - Including Operation Research
Graduate (Concentration) Advisors

- Materials Science & Engineering
  Professor Teiichi Ando, 249 SN
  617-373-3811, tando@coe.neu.edu

- Mechanics & Design
  Professor Sinan Muftu, 359 SN
  617-373-4743, smuftu@coe.neu.edu

- Mechatronics (coming soon!)
  Professor Nader Jalili, 373 SN
  617-373-3629, n.jalili@neu.edu
Graduate (Concentration) Advisors

- **Thermofluids Engineering**
  Professor Mo Taslim, 371 SN
  617-373-5514, m.taslim@neu.edu

- **Industrial Engineering**
  Professor Sagar Kamarthi, 301 SN
  617-373-3070, sagar@coe.neu.edu

- **Operation Research**
  Professor Emanuel Melachrinoudis
  Office: 334 Snell Engineering
  email: emelas@coe.neu.edu
Master of Science in ME and IE

- **Thesis Option** (required for all TA/RA students):
  - Six 4-SH Courses (24 SH), with min. QPA of 3.000
  - MS Thesis (8 SH)
  - Total of 32 SH; ~2 years

- **Project Option (IE)**:
  - Seven 4-SH Courses (28 SH), with min. QPA of 3.000
  - MS Project or Approved (Independent) Course (4 SH)
  - Total of 32 SH; ~1.5-2 years

- **Course Work Option**:
  - Eight 4-SH Courses (32 SH), with min. QPA of 3.000
  - Total of 32 SH; ~1.5 years
PhD Program in ME and IE

- **Coursework Requirements:**
  - **Entering with BS (Direct PhD) [~5 years]:**
    - Twelve 4-SH Courses (48 SH), with min. QPA of 3.000
    - A minor comprising of at least 8 SH outside of concentration
  - **Entering with MS (Regular PhD) [~4 years]:**
    - Six 4-SH Courses (24 SH), with min. QPA of 3.000
    - A minor comprising of at least 8 SH outside of concentration

- **PhD Qualifying Exam**
  - Preliminary Exam (6 hours of written exam on 4 different subjects)
  - Area Exam (oral presentation of research plan and oral area exam)

- **Dissertation Defense**
Dissertation Advisor

- Although there are no required courses for PhD program, students select courses in consultation with dissertation advisor or program advisor.

- Students choose dissertation adviser at the earliest possibility. For this, students meet with different professors in the department to discuss mutual research interests and funding opportunities.

- If appointed RA, contact your dissertation advisor.

- If appointed TA, contact Prof. Manny Melachrinoudis, the Associate Chair of the MIE Department.
Graduate School of Engineering Petition Form

- The primary use of the **Petition Form** is to request and document advisor and GSE approval for elective courses outside the approved curriculum for your program.
- This documentation is necessary to clear students to graduate at the end of their program.
Special Requirement for Both MS and PhD Programs in ME and IE

- All ME and IE graduate students must complete, during their first year of full-time study, the following two courses (each one with 0 SH):
  - Technical Writing Seminar (MEIE 6800), and
  - Research Seminar in Mechanical and Industrial Engineering (MEIE 6850).

- If appropriate, part-time students may petition the graduate committee to waive these requirements.
Department Seminar Series

- Department organizes seminar series every fall and spring.
- Distinguished speakers are invited to give talks on a wide range of cutting edge research topics.
- Both PhD and MS students are urged to attend the seminars.
- Look for the flyers on the department bulletin board for information.
PhD Preliminary Examination

- All Doctoral Students who hold a master’s degree must take the Preliminary Exam no later than the first time that it is offered after their first academic year of study.

- Those admitted directly with a bachelor’s degree must take the Preliminary Exam no later than the first time that it is offered after their first two years of study.

- The PhD Preliminary Examination is six hours in length and covers, with equal emphasis, four different subjects from among the twenty five subjects organized in the following nine groups (see table next).

- Students consult dissertation adviser to select these 4 subjects.
## Preliminary Examination Subjects

<table>
<thead>
<tr>
<th>Group</th>
<th>Subjects</th>
</tr>
</thead>
</table>
| A     | Engineering Mathematics (A1)  
       | Engineering Computation (A2)  
       | Probability and Statistics (A3) |
| B     | Thermodynamics (B1)  
       | Fluid Mechanics (B2)  
       | Heat Transfer (B3) |
| C     | Dynamics and Vibrations (C1)  
       | Mechanics of Deformable Bodies (C2)  
       | Dynamic Systems and Control (C3)  
       | Finite Element Method (C4) |
| D     | Materials Science (D1)  
       | Mechanical Behavior of Materials (D2)  
       | Thermodynamics of Materials (D3)  
       | Kinetics of Phase Transformations (D4)  
       | Fundamentals of Polymer Science and Engineering (D5) |
## Preliminary Examination Subjects …

<table>
<thead>
<tr>
<th>Group</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E</strong></td>
<td>Design and CAD/CAM (E1)</td>
</tr>
<tr>
<td><strong>F</strong></td>
<td>Human-Machine Systems (F1)</td>
</tr>
</tbody>
</table>
| **G** | Manufacturing Systems (G1)  
Production and Logistics (G2) |
| **H** | Operations Research (H1)  
Reliability and Quality Assurance (H2)  
Simulation (H3) |
| **I** | Software Engineering (I1)  
Computer Graphics (I2)  
Artificial Intelligence in Engineering (I3) |
Possible Preliminary Exam Areas for PhD IE Students

- Engineering mathematics
- Probability and statistics
- Design and CAD/CAM
- Human-machine systems
- Manufacturing system
- Production and logistics
- Operation research
- Reliability and quality assurance
- Simulation Analysis
- Software engineering
- Computer graphics
- Artificial intelligence in engineering
Qualifying Exam Results

- **Pass**
  - Students move on with research plan to prepare for a proposal defense

- **Conditional**
  - Students are invited to re-take the full-preliminary exam at a future offering

- **Fail**
  - Students are not permitted to continue in any of the MIE PhD programs
Pls. visit Graduate School of Engineering (GSE) website at [www.coe.neu.edu/gse](http://www.coe.neu.edu/gse) for most up-to-date information including:

- Academic Calendar
- Course Schedule
- Forms
- And Many More
Detailed Information Specific to Individual Concentration

Pls. jump into appropriate section in the following pages for your concentration area.

Materials Science & Engineering: pp. 22-27
Mechanics & Design: pp. 28-41
Thermofluids Engineering: pp. 42-51
Industrial Eng. & Operation Research: pp. 52-74
Materials Science & Eng. Concentration Area

Graduate Advisor:
Professor Teiichi Ando

Department of Mechanical & Industrial Engineering
MSME with Concentration in Materials Science (Total of 32 SH)

- **Thesis Option** (required for all TA/RA students):
  - Four 4-SH Any MATL XXXX Courses incl. ME 5600 (16 SH)
  - Two 4-SH Electives from ME XXXX, MATL XXXX or Other Graduate Engineering/Science Courses by Petition (8 SH)
  - ME 7990 MS Thesis (8 SH)

- **Course Work Option:**
  - Four 4-SH Any MATL XXXX Courses incl. ME 5600 (16 SH)
  - Four 4-SH Electives from ME XXXX, MATL XXXX or Other Graduate Engineering/Science Courses by Petition (16 SH)
Materials Science Courses

- Macroscopic Transport in Materials Processing
- Mechanical Behavior & Strengthening Mechanisms
- Thermodynamics of Materials
- Kinetics of Phase Transformations
- Properties & Processes of Electronic Materials
- Environmental Issues In Manufacturing & Product Use
- Corrosion of Materials
- Particulate Materials Process
- Structure, Properties & Processing of Polymeric Materials
- Advanced Materials Processing
Northeastern University
Department of Mechanical and Industrial Engineering

RESEARCH AREAS

- Energy
- Biomechanics
- Mechanical Engineering
- Human Factors Engineering
- Industrial Engineering Operations
- Bio-Mechatronics
- Nano-Manufacturing
- Materials Science & Engineering
- Healthcare Systems Engineering
- Human Factors Engineering

Click!
MATERIAL SCIENCE ENGINEERING

Materials Science has been the key enabler in virtually all of the engineering breakthroughs that have occurred from early metal ages to the present nano-age. In step with the scientific development and discovery of materials, members of the MIE faculty are involved in interdisciplinary research to further materials processing, synthesis and design. Research areas are aligned with Northeastern University’s broad initiatives of Sustainability, Security, and Health, as well as national initiatives in manufacturing and nanotechnology. Investigations in the areas of metals/alloys, polymers, bio-materials (including bio-mimetics), and composites incorporating nano-scale materials make use of experimental, theoretical, and computational techniques to tailor structure-processing-property relationships in materials for specific applications. Current areas of research include, controlling synthesis and assembly processes to produce well-defined atomic structures; defect engineering; manipulating atomic/micro-structures and the chemistry of materials to optimize properties for next-generation structural, electronic, and energy applications; solidification and deformation processing; and life cycle assessments for nano-composites/materials. The faculty and students are committed to creative thinking and engineering innovation to propel materials development to the forefront of scientific research.

- Ando, Teiichih
- Busnaina, Ahmed
- Gouldstone, Andrew
- Issacs, Jacqueline
- Jung, Yung Ikoon
- Lee, Hea Yeon
- Liu, Yongmin
- Minus, Marilyn
- Smyser, Bridget
- Upmanyu, Moneesh
- Vaziri, Ashkan
Materials Science and Eng. Faculty

- Professor Ando
- Professor Erb
- Professor Gouldstone
- Professor Jung
- Professor Isaacs
- Professor Liu
- Professor Minus
- Professor Upmanyu
Mechanics and Design Concentration Area

Graduate Advisor:

Professor Sinan Muftu
MSME with Concentration in Mechanics (Total of 32 SH)

- **Thesis Option** (required for all TA/RA students):
  - ME 6200 or ME 6201 (4 SH) – see descriptions
  - Two 4-SH Electives from ME XXXX, MATL XXXX or Other Graduate Engineering/Science Courses by Petition (8 SH)
  - ME 7990 MS Thesis (8 SH)
  - Three 4-SH Courses from “Mechanics” Concentration (12 SH)
    - ME 5650: Advanced Mechanics of Material
    - ME 5655: Dynamics & Mechanical Vibration
    - ME 5657: Finite Element Method
    - ME 5659: Control and Mechatronics
    - ME 7210: Elasticity & Plasticity
MSME with Concentration in Mechanics (Total of 32 SH)

Coursework Option:

- ME 6200 or ME 6201 (4 SH) – see descriptions
- Two 4-SH Any ME XXXX, MATL XXXX Courses (8 SH)
- Two 4-SH Electives from ME XXXX, MATL XXXX or Other Graduate Engineering/Science Courses by Petition (8 SH)
- Three 4-SH Courses from “Mechanics” Concentration (12 SH)
  - ME 5650: Advanced Mechanics of Material
  - ME 5655: Dynamics & Mechanical Vibration
  - ME 5657: Finite Element Method
  - ME 5659: Control and Mechatronics
  - ME 7210: Elasticity & Plasticity
Mechanics and Design Courses

- Elasticity & Plasticity
- Dynamics & Mechanical Vibration
- Advanced Mechanics of Material
- Finite Element Method
- Musculoskeletal Biomechanics
- Solid Mechanics - Cells & Tissues
- Control and Mechatronics
- Mechanics of Contact & Lubrication
- Theory of Plates & Shells
Mechanics and Design Courses …

- Advanced Finite Element Method
- Composite Materials
- Fracture Mechanics & Failure Analysis
- Advanced Vibration
- Advanced Control
- Continuum Mechanics
- Microelectromechanical Systems
- Nanomanufacturing
## Typical Program for Full-Time MS Students in Mechanics & Design

<table>
<thead>
<tr>
<th></th>
<th>Fall Semester</th>
<th>Spring Semester</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
<td>Mathematical Methods 1 (ME 6200) Technical Writing Seminar (MEIE 6800)</td>
<td>Research Seminar (MEIE 6850) And any two of the following: Advanced Mechanics of Materials (ME 5650)</td>
<td>Research</td>
</tr>
<tr>
<td></td>
<td>Research Seminar (MEIE 6850)</td>
<td>Finite Element Method (ME 5657) Control &amp; Mechatronics (ME 5659)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and one of: Dynamics &amp; Vibration (ME 5655) Elasticity &amp; Plasticity (ME 7210)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Second Year</strong></td>
<td>Dynamics &amp; Vibration (ME 5655) or Elasticity &amp; Plasticity (ME 7210) Elective or Thesis</td>
<td>Advanced Mechanics of Materials (ME 5650) or Finite Element Method (ME 5657) or Control &amp; Mechatronics (ME 5659) and Elective or Thesis</td>
<td>Research and Graduate</td>
</tr>
</tbody>
</table>
## Typical Program for Part-Time MS Students in Mechanics & Design

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall Semester</th>
<th>Spring Semester</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
<td>Mathematical Methods 1 (ME 6200)</td>
<td>Advanced Mechanics of Materials (ME 5650) or Finite Element Method (ME 5657) or Control &amp; Mechatronics (ME 5659)</td>
<td>Elective or Vacation</td>
</tr>
<tr>
<td><strong>Second Year</strong></td>
<td>Dynamics &amp; Vibration (ME 5655) or Elasticity &amp; Plasticity (ME 7210)</td>
<td>Advanced Mechanics of Materials (ME 5650) or Finite Element Method (ME 5657) or Control &amp; Mechatronics (ME 5659) or Elective</td>
<td>Elective or Vacation</td>
</tr>
<tr>
<td><strong>Third Year</strong></td>
<td>Elective</td>
<td>Advanced Mechanics of Materials (ME 5650) or Finite Element Method (ME 5657) or Control &amp; Mechatronics (ME 5659) or Elective</td>
<td>Elective or Vacation or Graduate</td>
</tr>
<tr>
<td><strong>Fourth Year</strong></td>
<td>Elective</td>
<td>Elective</td>
<td>Graduate</td>
</tr>
</tbody>
</table>
MECHANICS

Advances in mechanics enable key engineering innovations. Using complementary computational, experimental, and design tools, the mechanics area is addressing challenges from nanoscale actuators and human health to energy systems and bridges. For example, our biomechanics research is creating robotic rehabilitation aids and a new understanding of cellular biomechanics and the assembly and degradation of biomaterials. At the tiniest length scales, we are creating a new understanding of nanomechanics, contact mechanics, tribology, MEMS, and the application of nanomaterials for energy storage systems. Our research goals also include the understanding, design and creation of piezoeactive sensors and actuators as well as the stability assessment and control of dynamical systems. Our research and teaching together prepare students to understand and exploit mechanics to enable their future engineering innovations.

- Adams, George
- Chakravarthy, Srinath
- Gouldstone, Andrew
- Jalili, Nader
- Livermore, Carol
- Mavroidis, Constantinos
- Muftu, Sinan
- Naveh-Hashemi, Hamid
- Sipahi, Rifat
- Vaziri, Ashkan
- Wan, Kai-Tak
- Zeid, Ibrahim
MECHATRONICS

The name Mechatronics stems from Mechanical and Electronics. It is a multidisciplinary approach to product design and development, merging the principles of electrical, mechanical, computer, material, chemical and industrial engineering. Our mission is to produce broadly educated students in mechatronic systems with applications ranging from intelligent products and manufacturing processes to biological systems. MIE faculty members within Mechatronics group are involved with the modeling, design and manufacture of a variety of intelligent products and systems involving hybrid mechanical and electronic functions. More specifically, current areas of research within the group include modeling and control of next-generation micro/nano-electromechanical sensors and actuators, control and manipulation at the micro/nanoscale with new applications ranging from precision manipulation to imaging and sensing, rehabilitation mechatronics, nanorobotics, intelligent human-machine and human-computer interactions, driving simulator, nonintrusive sensor design, stability analysis and control synthesis of dynamical systems with delays, and control-systems-aided human-machine systems.

- Jalili, Nader
- Lin, Yingzi
- Mavroidis, Constantinos
- Sipahi, Rifa

Faculty Research Websites
- Biomedical Mechatronics Laboratory
- Complex Dynamic Systems and Control Laboratory
- Intelligent Human-Machine Systems (IHMS) Laboratory
- Piezoelectric Systems Laboratory (PSL)
BIOMECHANICS

Biomechanics is an interdisciplinary, multi-scale field of study in which the tools of mechanics are applied to biological systems. In practice, living tissues and their constituent components are highly mechanosensitive and mechanoresponsive. There is mounting evidence that even small forces, strains or shifts in material properties can drastically influence the behavior of systems of cells (i.e. substrate mechanical stiffness can control the differentiation state of stem cells). Thus, it is critical to develop tools capable of estimating to a high-degree of accuracy, the mechanical state of living biological systems. However, because of the complexity of the geometry and constitutive descriptions of tissues, cells and proteins, approaches to describe the mechanical response of these systems are challenging to devise, to apply and to validate. In the MIE department at Northeastern, we have a strong, talented group of researchers dedicated to biomechanics (and its corollary field: Mechanobiology). Please feel free to browse the web pages of our biomechanics team:

- Coskun, Ahmet
- Gouldstone, Andrew
- Mavroidis, Constantinos
- Muftu, Sinan
- Nayeb-Hashemi, Hamid
- Ruberti, Jeffrey
- Vaziri, Ashkan
- Wan, Kai-Tak

Faculty Research Websites
- Biomedical Mechatronics Laboratory
- Extra-cellular Matrix Laboratory
- High Performance Materials and Structures Laboratory
- Micro/Nano Biomechanical Characterization Laboratory
Mechanics and Design Faculty

- Professor Adams
- Professor Chakravarthy
- Professor Hashemi
- Professor Jalili
- Professor Livermore
- Professor Mavroidis
- Professor Muftu
- Professor Ruberti
- Professor Shefelbine
- Professor Sipahi
- Professor Vaziri
- Professor Wan
- Professor Zeid
Thermofluids Engineering Concentration Area

Graduate Advisor: Professor Mo Taslim
MSME with Concentration in Thermofluids Eng. (Total of 32 SH)

- **Thesis Option** (required for all TA/RA students):
  - ME 6200 or ME 6201 (4 SH) – see descriptions
  - ME 7270: General Thermodynamics (4 SH)
  - ME 7275: Essentials of Fluid Dynamics (4 SH)
  - Either ME 7285 (Heat Conduction and Thermal Radiation) or ME 7290 (Convection Heat Transfer) (4 SH)
  - One 4-SH Elective from ME XXXX, MATL XXXX or Other Graduate Engineering/Science Courses by Petition (4 SH)
  - ME 7990 MS Thesis (8 SH)
  - One 4-SH Course from “Thermofluids Engineering” Concentration” List (4 SH) – See the list next
MSME with Concentration in Thermofluids Eng. (Total of 32 SH)

Coursework Option:

- ME 6200 or ME 6201 (4 SH) – see descriptions
- ME 7270: General Thermodynamics (4 SH)
- ME 7275: Essentials of Fluid Dynamics (4 SH)
- Either ME 7285 (Heat Conduction and Thermal Radiation) or ME 7290 (Convection Heat Transfer) (4 SH)
- One 4-SH Elective from ME XXXX, MATL XXXX or Other Graduate Engineering/Science Courses by Petition (4 SH)
- Three 4-SH Course from “Thermofluids Engineering” Concentration” List (12 SH) – See the list next
Thermofluids Engineering

“Concentration” Courses

- ME 5695: Aerodynamics
- ME 7280: Statistical Thermodynamics
- ME 7300: Combustion and Air Pollution
- ME 7305: Fundamentals of Combustion
- ME 7310: Computational Fluid Dynamics With Heat Transfer
- ME 7320: Solar Thermal Engineering
- ME 7330: Turbulent Flow
- ME 7340: Turbomachinery Design
Thermofluids Engineering Courses

- General Thermodynamics
- Essentials of Fluid Dynamics
- Heat Conduction & Thermal Radiation
- Convective Heat Transfer
- Statistical Thermodynamics
- Aerodynamics
- Combustion & Air Pollution
- Fundamentals of Combustion
- Computational Fluid Dynamics With Heat Transfer
Thermofluids Engineering Courses …

- Heat Transfer Processes in Microdevices
- Solar Thermal Engineering
- Two-Phase Flow
- Turbulent Flow
- Aerosol Mechanics
- Turbomachinery Design
ENERGY

Developing and implementing energy solutions to maintain and grow our standard of living requires multifaceted solutions. Through the use of Mechanical Engineering sciences, not only will the future designs of renewable energy sources and nanoscale energy harvesting devices be conceived, but they will be integrated with existing systems to satisfy energy requirements of our society. Improving the energy usage of buildings through the use of better cooling and heating products designs, as well as introducing co-generation systems depends on educating the next generation of Mechanical Engineers. Research into combustion systems, designs to recycle waste to effective fuel sources and gas turbines are all integral parts of the energy solutions of the future that are embedded in the fabric of the Mechanical Engineering Department at Northeastern University.

- Busnaina, Ahmed
- Cipolla, John
- Coskun, Ahmet
- Jung, Yung Joon
- Kowalski, Gregory
- Levendis, Yiannis
- Liu, Yongmin
- Livermore, Carol
- Metghalchi, Hameed
- Narusawa, Uichiro
- Sheikhi, Reza
- Taslim, Mohammad
- Whalen, Richard
- Yener, Yaman

Faculty Research Websites
- Computational Energy and Combustion
- Thermodynamics and Combustion Laboratory
Thermofluids Engineering Faculty

- Professor Busnainia
- Professor Cipolla
- Professor Kowalski
- Professor Levendis
- Professor Metghalchi
- Professor Narusawa
- Professor Sheiki
- Professor Taslim
Next Steps …

- Meet with your concentration advisor for program planning
- Register for classes – Use “Registration Override Request Form” (available on GSE website under forms) when encountering a “Registration Add Error” which prevents from registering for a course online
- If you encounter further registration problems, contact Ms. Lisa O’Neill (li.oneill@neu.edu) or Mr. Bryce Cheney (b.cheney@neu.edu) in the Graduate School of Engineering Office (130 SN)
Industrial Engineering (IE) Graduate Program

IE Graduate Program Chair:
Professor Sagar Kamarthi
Operation Research (OR) Graduate Program

OR Graduate Program Chair: Professor Emanuel Melachrinoudis
IE and OR Programs

- MS IE
- MS OR
- PhD IE
- PhD IE Interdisciplinary Research
MS IE/OR Tracks

- MS IE/OR with 8 courses
- MS IE/OR with 7 courses, and a 4-credit project
- MS IE/OR with 6 courses, and a 8-credit thesis
**MS IE/OR with 8 Courses**

<table>
<thead>
<tr>
<th></th>
<th>Core Courses</th>
<th>Elective Courses</th>
<th>Total Courses/Credits</th>
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<tbody>
<tr>
<td>Courses</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Credits</td>
<td>16</td>
<td>16</td>
<td>32</td>
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## MS IE/OR with 7 Courses and a Project

<table>
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<th>Elective Courses</th>
<th>Project</th>
<th>Total Courses/Credits</th>
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<tr>
<td>Courses</td>
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<td>3</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Credits</td>
<td>16</td>
<td>12</td>
<td>4</td>
<td>32</td>
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</table>
# MS IE/OR with 6 Courses and a Thesis

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<th>Elective Courses</th>
<th>Thesis</th>
<th>Total Courses/ Credits</th>
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<tr>
<td>Courses</td>
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<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Credits</td>
<td>16</td>
<td>8</td>
<td>8</td>
<td>32</td>
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# MS IE Core Courses

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<th>Required Courses</th>
<th>Course Number</th>
<th>Course Name</th>
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<td>2 courses</td>
<td>IE 6200</td>
<td>Engineering Probability and Statistics</td>
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<tr>
<td></td>
<td>OR 6205</td>
<td>Deterministic Operations Research</td>
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<table>
<thead>
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<th>Course Number</th>
<th>Course Name</th>
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<td>IE 7210</td>
<td>Production Systems</td>
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<tr>
<td></td>
<td>IE 7215</td>
<td>Simulation Analysis</td>
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<tr>
<td></td>
<td>IE 7315</td>
<td>Human Factors</td>
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# MS IE Elective Courses

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<tr>
<th>Subject Areas</th>
<th>Courses</th>
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<tr>
<td>Operations Research</td>
<td>OR 7230, OR 7235, OR 7240, OR 7245, OR 7250</td>
</tr>
<tr>
<td>Human Factors</td>
<td>CSYE 7270, CSYE 7280, IE 7280, IE 7315, IE 7615</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>CSYE 7260, IE 7255, IE 5620, IE 7270, IE 7315</td>
</tr>
<tr>
<td>Quality and Reliability</td>
<td>IE 7280, IE 7285, IE 7290</td>
</tr>
<tr>
<td>Computer Sys Engineering</td>
<td>CSYE 6200, CSYE 6210, CSYE 6220, CSYE 7230, CSYE7270</td>
</tr>
<tr>
<td>Engineering Management</td>
<td>EMGT 5220, EMGT 6225, EMGT 5300, EMGT 6305, OR 7310</td>
</tr>
<tr>
<td>Any Engineering Discipline</td>
<td>Approval of program adviser required</td>
</tr>
<tr>
<td>Any Business Discipline</td>
<td>Approval of program adviser required</td>
</tr>
<tr>
<td>Information Systems</td>
<td>Approval of program adviser required</td>
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## MS IE Project/Thesis Courses

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Credits</th>
<th>Courses Name</th>
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<tbody>
<tr>
<td>IE 7945</td>
<td>4</td>
<td>Master’s Project</td>
</tr>
<tr>
<td>IE 7990</td>
<td>2 to 8</td>
<td>Thesis</td>
</tr>
<tr>
<td>IE 7996</td>
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<td>Thesis Continuation</td>
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# MS OR Core Courses

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Course Number</th>
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<tbody>
<tr>
<td>4 courses</td>
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<tr>
<td></td>
<td>IE 6200</td>
<td>Engineering Probability and Statistics</td>
</tr>
<tr>
<td></td>
<td>or MATH 7241</td>
<td>Probability 1</td>
</tr>
<tr>
<td></td>
<td>OR 6205</td>
<td>Deterministic Operations Research</td>
</tr>
<tr>
<td></td>
<td>OR 7230</td>
<td>Probabilistic Operations Research</td>
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<tr>
<td></td>
<td>or MATH 7341</td>
<td>Probability 2</td>
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<tr>
<td></td>
<td>MATH 7234</td>
<td>Optimization and Complexity</td>
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# MS OR Elective Courses

<table>
<thead>
<tr>
<th>Subject Areas</th>
<th>Courses</th>
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<tr>
<td>Operations Research</td>
<td>OR 7235, OR 7240, OR 7245, OR 7250, OR 7260, OR 7310, EECE 7360</td>
</tr>
<tr>
<td>Probability &amp; Statistics</td>
<td>IE 7280, MATH 7342, MATH 7346, MATH 7347, MATH 7349</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>IE 7210, IE 7215, IE 7275, IE 7285, IE 7290, IE 7315, IE 7615</td>
</tr>
<tr>
<td>Computer Science/ Comp Systems/ Information Sys</td>
<td>CS 5800, CS 7805, CSYE 6200, CSYE 6205, INFO 6205, INFO 6210</td>
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<tr>
<td>Engineering Management</td>
<td>EMGT 5220, EMGT 6225, EMGT 5300, EMGT 6305</td>
</tr>
<tr>
<td>Any Engineering Discipline</td>
<td>Approval of program adviser required</td>
</tr>
<tr>
<td>Any Mathematics/ Computer Science</td>
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<tr>
<td>Some Business courses</td>
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## MS OR Project/Thesis Courses

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Credits</th>
<th>Courses Name</th>
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</thead>
<tbody>
<tr>
<td>OR 7945</td>
<td>4</td>
<td>Master’s Project</td>
</tr>
<tr>
<td>OR 7990</td>
<td>2 to 8</td>
<td>Thesis</td>
</tr>
<tr>
<td>OR 7996</td>
<td>0</td>
<td>Thesis Continuation</td>
</tr>
</tbody>
</table>
Research Areas

- Healthcare
- Environmentally responsible manufacturing
- Operations research
- Quality control
- Human factors
- Manufacturing
Research Areas

- **James Benneyan** (Healthcare quality and operational efficiency)
- **Thomas Cullinane** (Facilities design, project management)
- **Nasser Fard** (Quality and reliability)
- **Jackie Griffin** (Healthcare operations scheduling and efficiency)
- **Surendra Gupta** (Environmentally Conscious manufacturing)
- **Sagar Kamarthi** (Prognostics, scalable nanomanufacturing)
- **Yingzi Lin** (Human machine systems, bio sensors)
- **Emanuel Melachrinoudis** (Operations Research, Logistics)
- **Allen Soyster** (Operations research)
- **Ayten Turkcan** (Healthcare operations scheduling and efficiency)
## Other Recommended Courses

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Credits</th>
<th>Courses Name</th>
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</thead>
<tbody>
<tr>
<td>ENCP 6000</td>
<td>1</td>
<td>Introduction to Co-op</td>
</tr>
<tr>
<td>MEIE 6800</td>
<td>0</td>
<td>Technical Writing Seminar</td>
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<tr>
<td>MEIE 6850</td>
<td>0</td>
<td>Research Seminar in Mechanical and Industrial Engineering</td>
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# Course Description

<table>
<thead>
<tr>
<th>Item</th>
<th>URL</th>
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<tbody>
<tr>
<td>MS IE Program Requirements</td>
<td><a href="http://www.coe.neu.edu/gse/programs/MIE/MIE_MSIE.html">http://www.coe.neu.edu/gse/programs/MIE/MIE_MSIE.html</a></td>
</tr>
<tr>
<td>COE Graduate School of Eng.</td>
<td><a href="http://www.coe.neu.edu/gse/">http://www.coe.neu.edu/gse/</a></td>
</tr>
</tbody>
</table>
You can search for courses at MyNEU. To find graduate course offerings relevant to IE program, you should search under different subject areas:

- **Subject**
  - Industrial Engineering
  - Operations research
  - Engineering Management
  - Computer Systems Engineering
  - Information Systems Program
  - Mechanical & Industrial Eng
  - Mechanical Engineering
  - Supply Chain Management
  - Engineering Cooperative Ed

- **Course Level**
  - Graduate
# Courses Offered in Fall 2013

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Mode</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMGT 5220</td>
<td>OG, VS</td>
<td>Engineering Project Management</td>
</tr>
<tr>
<td>EMGT 5300</td>
<td>OG 2 sections, VS</td>
<td>Engineering Organisationnel Psychology</td>
</tr>
<tr>
<td>EMGT 6225</td>
<td>OG, VS</td>
<td>Economic Decision Making</td>
</tr>
<tr>
<td>EMGT 6305</td>
<td>OG 2 sections, VS</td>
<td>Financial Management  for Eng</td>
</tr>
<tr>
<td>IE 5617</td>
<td>OG 2 sections</td>
<td>Lean Concepts and Applications</td>
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<tr>
<td>IE 5620</td>
<td>ON</td>
<td>Mass Customization</td>
</tr>
<tr>
<td>IE 6200</td>
<td>OG 3 sections, ON</td>
<td>Engineering Probability and Statistics</td>
</tr>
<tr>
<td>IE 7215</td>
<td>OG, VS</td>
<td>Simulation Analysis</td>
</tr>
<tr>
<td>IE 7285</td>
<td>OG, VS</td>
<td>Statistical Quality Control</td>
</tr>
<tr>
<td>OR 6205</td>
<td>OG 3 sections, ON</td>
<td>Deterministic Operations Research</td>
</tr>
<tr>
<td>OR 7230</td>
<td>VS</td>
<td>Probabilistic Operations Research</td>
</tr>
<tr>
<td>OR 7240</td>
<td>OG, VS</td>
<td>Integer and Nonlinear Optimization</td>
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</table>

| OG: On Ground course | ON: On Line course | VS: Video Streaming course |
## Academic Advice

<table>
<thead>
<tr>
<th>Contact Name</th>
<th>Role</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sagar Kamarthi</td>
<td>IE Graduate Program Chair</td>
<td>617-373-3070, <a href="mailto:sagar@coe.neu.edu">sagar@coe.neu.edu</a></td>
</tr>
<tr>
<td>Manny Melachrinoudis</td>
<td>OR Graduate Program Chair and Director of IE and Associate Department Chair</td>
<td>617-373-4850, <a href="mailto:emelas@coe.neu.edu">emelas@coe.neu.edu</a></td>
</tr>
<tr>
<td>Hanchen Huang</td>
<td>MIE Department Chair</td>
<td>617/373-2186, <a href="mailto:h.huang@neu.edu">h.huang@neu.edu</a></td>
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</table>
## Co-op Decisions

<table>
<thead>
<tr>
<th>Contact Name</th>
<th>Role</th>
<th>Contact Information</th>
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</thead>
<tbody>
<tr>
<td>Barry Satvat</td>
<td>Assoc. Coop-Coordinator and Director</td>
<td>617-373-3461, <a href="mailto:b.satvat@neu.edu">b.satvat@neu.edu</a></td>
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</tbody>
</table>
## Useful URLs

<table>
<thead>
<tr>
<th>Item</th>
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<tbody>
<tr>
<td>Graduate school of Engineering</td>
<td><a href="http://www.coe.neu.edu/gse/">http://www.coe.neu.edu/gse/</a></td>
</tr>
<tr>
<td>Course schedule Information</td>
<td></td>
</tr>
<tr>
<td>Graduate programs Forms/handbooks</td>
<td></td>
</tr>
<tr>
<td>Mech. &amp; Ind. Eng Department</td>
<td><a href="http://www.mie.neu.edu/">http://www.mie.neu.edu/</a></td>
</tr>
<tr>
<td>NU Registrar’s Office</td>
<td><a href="http://www.northeastern.edu/registrar/">http://www.northeastern.edu/registrar/</a></td>
</tr>
<tr>
<td>NU Library</td>
<td><a href="http://www.lib.neu.edu/">http://www.lib.neu.edu/</a></td>
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<tr>
<td>MyNEU</td>
<td><a href="http://myneu.neu.edu/cp/home/displaylogin">http://myneu.neu.edu/cp/home/displaylogin</a></td>
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<tr>
<td>Blackboard</td>
<td><a href="http://blackboard.neu.edu/">http://blackboard.neu.edu/</a></td>
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</table>
Next Steps …

- Meet with your concentration advisor for program planning

- Register for classes – Use “Registration Override Request Form” (available on GSE website under forms) when encountering a “Registration Add Error” which prevents from registering for a course online

- If you encounter further registration problems, contact Ms. Lisa O’Neill (li.oneill@neu.edu) or Mr. Bryce Cheney (b.cheney@neu.edu) in the Graduate School of Engineering Office (130 SN)