The Center for Leadership Education
Master of Science in Engineering Management
Graduate Student Guide
2019 - 2020
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Welcome to the Master of Science in Engineering Management Program! This manual can help you plan a program of graduate study leading to the Master of Science in Engineering Management (MSEM) degree. Its pages are devoted to policies, rules, procedures, and suggestions that can be useful as you plan your studies.

If you need additional information or have any questions or concerns, please contact us at: msem@jhu.edu or call the MSEM Coordinator at 410-516-1108. Our offices are located on the Johns Hopkins Homewood campus in 102 Whitehead Hall and our doors are always open for students! Additionally, for more information on the program, please peruse the MSEM website: https://msem.engineering.jhu.edu/

Upon arrival at Johns Hopkins University, please stop by the office in Suite 105 and introduce yourself. We look forward to meeting you. At this time, we will also give you keys to the building, to Suite 105 and to the dedicated MSEM Lounge, specifically designated for your use and productivity. Additionally, during the MSEM Orientation, we will take a picture of you to include in our MSEM directory.

For your reference, please find our faculty and staff directory after the table of contents.
Faculty and Staff Directory

**Director:**
Pamela H. Sheff: pamsheff@gmail.com

**Full-Time Faculty:**
Lawrence Aronhime: aronhime@jhu.edu
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Illysa Izenberg: izenberg@jhu.edu
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**Staff:**
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Administrative Secretary, CLE
410-516-8205

Lindsey Menzies: lconkli4@jhu.edu
Sr. Academic Program Coordinator, CLE & MSEM
410-516-1108

Emily Myrick: emyrick2@jhu.edu
Sr. Academic Program Coordinator, CLE
410-516-4753
## Management Course Requirements for Degree Completion

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Semester/Year</th>
<th>Credits</th>
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<tbody>
<tr>
<td>662.611</td>
<td>Strategies: Accounting &amp; Finance – required cohort</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>662.692</td>
<td>Strategies for Innovation &amp; Growth – required cohort</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>663.618</td>
<td>Professional Presentations – required cohort</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>662.643</td>
<td>The Practice of Consulting – required cohort</td>
<td>Winter</td>
<td>1.5</td>
</tr>
<tr>
<td>663.660</td>
<td>Managing People/Resolving Conflict – required cohort</td>
<td>Spring</td>
<td>1.5</td>
</tr>
<tr>
<td>663.671</td>
<td>Leading Change – required cohort</td>
<td>Spring</td>
<td>1.5</td>
</tr>
<tr>
<td>662.802</td>
<td>MSEM Internship–optional</td>
<td>Optional</td>
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<tr>
<td>663.xxx</td>
<td>Elective</td>
<td>Elective</td>
<td>1.5</td>
</tr>
<tr>
<td>663.653</td>
<td>Innovation and Business Design (elective)</td>
<td>Fall &amp; Spring</td>
<td>6</td>
</tr>
<tr>
<td>662.811/812</td>
<td>MSEM Seminar – required cohort</td>
<td>Fall &amp; Spring</td>
<td>1</td>
</tr>
</tbody>
</table>

**Students must take the following for degree completion:**

- **Required:** five advanced courses in a declared technical track of engineering or applied science.
- **Fall semester:** a cohort-based management curriculum consisting of three required courses, plus the MSEM seminar:
  - Strategies in Accounting and Finance
  - Strategies for Innovation and Growth
  - Professional Presentations
- **Winter Intersession:** The Practice of Consulting
- **Spring Semester:** Two half-semester courses:
  - Managing People/Resolving Conflict
  - Leading Change
- **Electives:** one required electives, selected from an approved list of Professional Development Program seven-week modules, or the internship. Please note: students may choose as many electives as they can comfortably complete. In addition, 663.653 Innovation and Entrepreneurship also serves as a Management Elective or as a course for the Interdisciplinary Track (with the approval of your advisor). Students in the Civil Engineering track already have approval.
Other Requirements

Interdivisional Course Registration:
Students may need to register in another division. You must complete an IDR and send to the registrar: grrregistration@jhu.edu

Engineering for Professionals Courses:
The WSE’s Engineering for Professionals (EP) program offers a variety of classroom and online courses. Depending on the policies of your technical track, you may count up to two EP courses towards your degree. EP courses at the 400-level or above are considered graduate level courses. For more information, please refer to http://ep.jhu.edu/

Whiting School of Engineering Degree Requirements:
All Whiting School of Engineering master’s degree candidates must meet the requirements found below:

- Every student must register for a minimum of two semesters as a full-time, graduate student.
- Full time students are required to take a minimum of nine credits each semester.
- Every student must provide certification by a department or program committee that all departmental or committee requirements have been fulfilled.
- All courses applied to the master’s degree must be at the 400-level or higher. At their discretion, individual graduate programs may institute a higher course level as the minimum for their students.
- Every student must earn the master’s degree within five consecutive academic years (10 semesters). Only semesters during which a student has a university-approved leave of absence are exempt from the ten-semester limit.

Specific Requirements to MSEM:

- Candidates must complete all of the required courses.
- Only one C will apply toward the degree (no grade lower than a C will apply to degree)
- All courses must be at the 400-level or higher (departmental graduate level).
- Departments sponsoring technical tracks may impose stricter requirements for coursework within the interdisciplinary track.
- With permission of the student’s advisor, an MSEM student may double-count two JHU courses or apply undergraduate or graduate courses taken at JHU but not applied to a degree (in accordance with conditions in the WSE Policy on Double-Counting Courses).
Rules & Regulations

Academic Ethics:
Enrollment in the online tutorial EN.500.603 Academic Ethics, which instructs on academic and ethical responsibilities, is automatic. This 20-minute tutorial is mandatory and to be completed within the first eight weeks of the student’s first semester. The Whiting School of Engineering will notify new students when the course is available.

Academic Probation:
Students who receive more than one C in the program will be placed on Academic Probation. The student will be required to meet with the director on a regular basis during the following semester and to replace the course in which he/she received the second C with another course. If the student receives another C, he or she is subject to dismissal from the program. Please find more information on WSE Probation Policies here.

General Graduate Student Policies: http://homewoodgrad.jhu.edu/academics/policies/

Diversity Information: http://homewoodgrad.jhu.edu/?s=Diversity

Dual Degrees:
JHU MSEM students may not enroll in another graduate program simultaneously. Students may have two tracks within MSEM, but may not begin another graduate program until the MSEM degree is complete.

Advising:
The Registrar’s Office will assign an engineering advisor. Students are required to obtain approval for all engineering track course choices from their technical advisor. The MSEM director, Pamela Sheff, or MSEM coordinator, L, will advise students on management courses. Technical advisors will have the authority and responsibility of placing holds, releasing holds, and clearing students’ technical courses for acceptance at the time of graduation. In order to allow flexibility within the tracks, advisors have the authority to approve changes and/or substitutions to any courses in their track they deem acceptable and appropriate.

Graduation:
Students will receive individual course check sheets for verification each semester. Track Advisors will receive graduating advisees check sheets for approval and signature in the weeks before graduation and then forwarded to the Dean’s Office.
### MSEM Technical Tracks & Advisors

Currently, our technical tracks and their sponsoring departments are:

<table>
<thead>
<tr>
<th>Department</th>
<th>Advisor &amp; Email</th>
<th>Tracks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><a href="mailto:basu.amitabh@jhu.edu">basu.amitabh@jhu.edu</a></td>
<td></td>
</tr>
<tr>
<td>Chemical &amp; Biomolecular Engineering</td>
<td>Marc Donohue</td>
<td>Chemical &amp; Biomolecular Engineering, Chemical Product Design</td>
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<tr>
<td></td>
<td><a href="mailto:mdd@jhu.edu">mdd@jhu.edu</a></td>
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</tr>
<tr>
<td>Civil Engineering</td>
<td>Thomas Gernay</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:tgeray@jhu.edu">tgeray@jhu.edu</a></td>
<td></td>
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<tr>
<td>Computer Science</td>
<td>Russ Taylor</td>
<td>Computer Science</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:rht@jhu.edu">rht@jhu.edu</a></td>
<td></td>
</tr>
<tr>
<td>Computer Science/Information Security Institute</td>
<td>Anton Dahbura</td>
<td>Cyber Security</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:antondahbura@jhu.edu">antondahbura@jhu.edu</a></td>
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<tr>
<td>Electrical &amp; Computer Engineering</td>
<td>Ralph Etienne Cummings</td>
<td>Communications Science, Smart Product &amp; Device Design</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:retienne@jhu.edu">retienne@jhu.edu</a></td>
<td></td>
</tr>
<tr>
<td>Geography &amp; Environmental Engineering</td>
<td>Benjamin Hobbs</td>
<td>Environmental Systems Analysis, Economics &amp; Public Policy</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:bhabbs@jhu.edu">bhabbs@jhu.edu</a></td>
<td></td>
</tr>
<tr>
<td>Materials Science &amp; Engineering</td>
<td>Timothy Weihs</td>
<td>Biomaterials, Materials Science &amp; Engineering, Nano-Biotechnology, Nanomaterials &amp; Nanotechnology</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:weih@jhu.edu">weih@jhu.edu</a></td>
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<tr>
<td>Mechanical Engineering</td>
<td>Gretar Tryggvason</td>
<td>Fluid Mechanics, Mechanical Engineering, Mechanics &amp; Materials</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:gtryggv1@jhu.edu">gtryggv1@jhu.edu</a></td>
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</tr>
<tr>
<td>Space Systems Engineering, Engineering for Professionals Program</td>
<td>Patrick Binning</td>
<td>Space Systems Engineering</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:Patrick.binning@jhu.edu">Patrick.binning@jhu.edu</a></td>
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<tr>
<td>Systems Engineering</td>
<td>Kimia Ghobadi</td>
<td>Systems Engineering</td>
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<tr>
<td></td>
<td><a href="mailto:kimia@jhu.edu">kimia@jhu.edu</a></td>
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</table>
MSEM TECHNICAL TRACK REQUIREMENTS

I. **Biomaterials** *(Sponsored by the Department of Materials Science & Engineering)*

   Prerequisites (5)
   - UG calculus, chemistry, biology, physics and introductory biomaterials course equivalent to 510.316

   Required Courses (3)
   - Approval of substitutions for required courses are at the discretion of the advisor
   - 510.606 Chemical and Biological Properties of Materials (PR: UG chemistry and biology or permission)
   - 510.607 Biomaterials II (PR: 510.606 Biomaterials I or equivalent)
   - 510.621 Structure and Thermodynamics of Biomolecules

   Electives (2)
   - Electives should be related to Materials Science and Engineering and must be approved by the DMSE graduate committee.

   List of Pre-approved Electives
   *Courses not on this list are at the advisor’s discretion.*
   - 510.400 Introduction to Ceramics
   - 510.403 Materials Characterization
   - 510.405 Materials Physics
   - 510.422 Micro- and Nano-structured Materials and Devices
   - 510.426 Biomolecular Materials
   - 510.428 Materials Science Laboratory I
   - 510.429 Materials Science Laboratory II
   - 510.430 Biomaterials Lab
   - 510.431 Biocompatibility of Materials
   - 510.456 Introduction to Surface Science
   - 500.619 Fundamental Physics and Chemistry of Nanomaterials
   - 510.604 Mechanical Properties of Materials
   - 510.605 Electronic, Optical and Magnetic Properties of Materials
   - 510.606 Chemical and Biological Properties of Materials
   - 510.607 Biomaterials II
   - 510.608 Electrochemistry
   - 510.611 Solid State Physics
   - 510.612 Solid State Physics
2. **Chemical and Biomolecular Engineering** (*Sponsored by the Department of Chemical and Biomolecular Engineering*)

**Required Courses (3)**
*Substitutions for required course scan be made at the advisor’s discretion.*
- 540.671 Advanced Thermodynamics in Practice
- 540.604 Advanced Chemical Reaction Engineering in Practice
- 540.673 Transport Phenomena in Practice

**Elective Courses (2)**
- Any two courses from 540.6xx or above, or 545.6xx or above (excluding seminar)
- Other elective courses must be approved at the advisor’s discretion

3. **Civil Engineering** (*Sponsored by the Department of Civil Engineering*)

**Required Courses (3)**
*Approval of substitutions for required courses are at the discretion of the advisor*
- 560.604 Solid Mechanics for Structures
- 560.440 Applied Finite Methods
  - **OR**
  - 560.730 Finite Element Methods

**Elective Courses (2)**
*Alternative selections are at the discretion of the advisor*
- Any two courses from 560.4xx or above, or 565.4xx or above (excluding seminar)
- One course from 560.6xx or 560.7xx (excluding seminar)

4. **Chemical Product Design** (*Sponsored by the Department of Chemical and Biomolecular Engineering*)

**Required (2)**
- 540.690 Product Design
- 540.691 Product Design
Elective Courses (3)
Two 540.6xx ChemBE courses
One Approved Elective in Engineering, Science, Math, Applied Math

5. Communications Science *(Sponsored by the Department of Electrical & Computer Engineering, ECE)*

When electing a concentration in ECE, here are additional options as to what you can pursue:

1) human language technologies

2) computation and bio photonics

3) Microsystems and computer engineering

4) machine learning and artificial intelligence

5) signal processing and sensory processing

Required (5)
_A combination of five courses in communications and related fields from the list below. Approval of substitute courses are at the discretion of the advisor._

- 520.435 Digital Signal Processing
- 520.447 Introduction to Information Theory & Coding
- 520.628 Satellite Communication System
- 520.646 Wavelets and Filter Banks
- 520.651 Random Signal Analysis
- 520.652 Filtering and Smoothing
- 520.666 Information Extraction
- 520.735 Sensory Information Processing

Elective Courses (2)
_Courses not listed below are approved at the advisor’s discretion._

Option #1: Geared toward those with interest in a broad range of communications
Any two (2) of the following courses, approved by the faculty advisor:

Courses in ECE:
520.447 Information Theory and Coding
520.460 Error Control Coding
520.435 Digital Signal Processing

Courses in the Johns Hopkins Engineering for Professionals (EP) Program: 520.608
Next Generation Telecommunications  
525.616 Communications Systems Engineering 525.618 
Antenna Systems  
525.631 Adaptive Signal Processing  
525.638 Introduction to Wireless Technology  
525.641 Computer and Data Communication Networks  
525.654 Communications Circuits Laboratory  
525.708 Iterative Methods in Communications Systems 525.721 
Advanced Digital Signal Processing  
525.722 Wireless and Mobile Cellular Communications 525.738 
Advanced Antenna Systems  
525.751 Software Radio for Wireless Communications  
525.762 Signal Processing with Wavelets  
525.768 Wireless Networks  
525.771 Propagation of Radio Waves in the Atmosphere  

Option #2: Geared toward those with interest in optical communications Any two (2) of the following courses, approved by the faculty advisor: 525.613 
Fourier Techniques in Optics  
525.625 Laser Fundamentals  
520.636 Optics and Photonics Laboratory  
525.753 Optical Propagation, Sensing and Backgrounds  
525.772 Fiber-Optic Communications Systems  
525.797 Advanced Fiber Optic Laboratory  

Courses not on this list can be used at the advisor’s discretion.  

6. **Computer Science (Sponsored by the Department of Computer Science) Pre-requisites**

- Entering students must have completed a program of study equivalent to that required by the B.S. in computer science.  
- Applicants from other disciplines are required to have coursework (or equivalent experience) in intermediate programming (C++ and Java), data structures, automata theory, computer systems fundamentals and algorithms.  

Required (5)  
Alternative selections are made at the advisor’s discretion.  
- Any five regular graduate courses, 400-level or higher, from the Department of Computer Science, not including the senior thesis.  
- MSEM students in this track may take no more than three graduate-level courses in one semester.  

7. **Cybersecurity** (Sponsored by the Information Security Institute)  

Pre-Requisites:
Entering students are expected to have completed a program of study equivalent to that required by at least an undergraduate minor in computer science and a computer science BS is recommended.

Applicants from other disciplines must have coursework (or equivalent experience) in Computer System Fundamentals, Programming, Data Structures, and Discrete Math.

If the necessary background courses are lacking, students must take undergraduate courses to possess these prerequisites. These courses will not count toward the MSEM degree but will appear on the transcript.

Curricular Requirements (5):

- A combination of five graduate courses, 600-level or higher, are taken from the Information Security Institute required as below:
  - Two courses from the Core Technology and/or the Elective Technology course lists;
  - One Core Policy course and one Core Management course;
  - The fifth course from any of the above course categories.

No more than three graduate-level courses by the Information Security Institute may be taken in one semester by an MSEM student in this track.

*Alternative selections are allowed at the advisor’s discretion.*

8. **Fluid Mechanics (Sponsored by the Department of Mechanical Engineering and the Department of Materials Science and Engineering)**

*Required (5)*

*Alternative selections can be made at the advisor’s discretion.*

- Any five course in Fluid Mechanics or closely related discipline, at the 400-level or higher, as approved by the Faculty advisor.
- At least two of the required technical courses must be at the 600-level or higher.

9. **Materials Science & Engineering (Sponsored by the Department of Materials Science & Engineering)**

*Prerequisites (3)*

- UG calculus, chemistry and physics; biology is recommended

*Required Courses (1)*

*Approval of alternative courses are at the discretion of the advisor.*

- 510.601 Structures of Materials (PR: UG calculus, chemistry and physics or permissions)

*Electives (4)*

- Electives related to Materials Science and Engineering and are approved by the DMSE graduate committee.
- Approval of alternative courses are at the discretion of the advisor.
List of Pre-approved Electives

- 510.400 Introduction to Ceramics
- 510.403 Materials Characterization
- 510.405 Materials Physics
- 510.422 Micro- and Nano-structured Materials and Devices
- 510.426 Biomolecular Materials
- 510.428 Materials Science Laboratory I
- 510.429 Materials Science Laboratory II
- 510.430 Biomaterials Lab
- 510.431 Biocompatibility of Materials
- 510.456 Introduction to Surface Science
- 510.604 Mechanical Properties of Materials
- 510.605 Electronic, Optical and Magnetic Properties of Materials
- 510.606 Chemical and Biological Properties of Materials
- 510.607 Biomaterials II
- 510.608 Electrochemistry
- 510.611 Solid State Physics
- 510.612 Solid State Physics
- 510.619 Biopolymer Synthesis
- 510.620 Metallic Glasses
- 510.622 Micro- and Nano-Structured Materials and Devices
- 510.657 Materials Science of Thin Films

10. Mechanical Engineering (Sponsored by the Department of Mechanical Engineering)

Approval of alternative courses are at the discretion of the advisor.

Required (5)

- Any five courses in Mechanical Engineering, or closely related discipline at the 400-level or higher, as approved by the Faculty advisor.
- At least two of the required technical courses must be at the 600-level or higher.

11. Mechanics and Materials (Sponsored jointly by the Department of Mechanical Engineering and the Department of Materials Science & Engineering)

Required Courses (3)

Approval of alternative courses are at the discretion of the advisor.

- 510.601 Structures of Materials
- 510.604 Mechanical Properties of Materials
- 530.602 Mechanics of Solids

Elective Courses (2)

Approval of alternative courses are at the discretion of the advisor.

Any two (2) of the following courses, approved by the faculty advisor:

- 510.403 Materials Characterization
- 510.428 Materials Science Laboratory I
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>530.405</td>
<td>Mechanics of Solids and Structures</td>
</tr>
<tr>
<td>530.414</td>
<td>Computer-Aided Design</td>
</tr>
<tr>
<td>530.416</td>
<td>Advanced Mechanical Design</td>
</tr>
<tr>
<td>530.418</td>
<td>Aerospace Structures</td>
</tr>
<tr>
<td>530.454</td>
<td>Manufacturing Engineering</td>
</tr>
<tr>
<td>530.487</td>
<td>Introduction to Microelectromechanical Systems</td>
</tr>
<tr>
<td>510.602</td>
<td>Thermodynamics of Materials</td>
</tr>
<tr>
<td>510.603</td>
<td>Phase Transformations in Materials</td>
</tr>
<tr>
<td>530.612</td>
<td>Computational Solid Mechanics</td>
</tr>
</tbody>
</table>
12. **Nano-Biotechnology** *(Sponsored by the Department of Materials Science & Engineering)*

**Prerequisites (5)**

UG calculus, chemistry, biology, physics and introductory biomaterials course equivalent to 510.316

**Required Courses (3)**

*Substitutions for required course are at the advisor’s discretion.*

- 510.422 Micro- and Nano-Structured Materials and Devices
- 510.607 Biomaterials II (PR: 510.316 - Biomaterials I or permission)
- 670.619 Fundamental Physics and Chemistry of Nanomaterials

**Electives (2)**

- Electives should be related to Materials Science and Engineering and must be approved by the DMSE graduate committee
- Elective courses on the list below can be approved at the advisor’s discretion

**List of Pre-approved Electives**

- 510.400 Introduction to Ceramics
- 510.403 Materials Characterization
- 510.405 Materials Physics
- 510.422 Micro- and Nano-structured Materials and Devices
- 510.426 Biomolecular Materials
- 510.428 Materials Science Laboratory I
- 510.429 Materials Science Laboratory II
- 510.430 Biomaterials Lab
- 510.431 Biocompatibility of Materials
- 510.456 Introduction to Surface Science
- 500.619 Fundamental Physics and Chemistry of Nanomaterials
- 510.604 Mechanical Properties of Materials
- 510.605 Electronic, Optical and Magnetic Properties of Materials
- 510.606 Chemical and Biological Properties of Materials
- 510.607 Biopolymers
- 510.608 Electrochemistry
- 510.611 Solid State Physics
- 510.612 Solid State Physics
- 510.617 Advanced Topics in Biomaterials
- 510.619 Biopolymer Synthesis
- 510.620 Amorphous and Nano crystalline Metals
- 510.622 Micro- and Nano-Structured Materials and Devices
- 510.624 Theory of X-ray Diffraction
- 510.650 Principles of Quantum Physical Interactions
- Materials Science of Thin Films
13. **Nanomaterials and Nanotechnology** *(Sponsored by the Department of Materials Science & Engineering)*

**Prerequisites (3)**
UG calculus, chemistry, and physics

**Required Courses (2)**
*Approval of substitutions for required course are made at the advisor’s discretion*
- 510.422 Micro- and Nano-Structured Materials and Devices
- 500.619 Fundamental Physics and Chemistry of Nanomaterials (PR: Permission of the instructor)

**Electives (3)**
- Electives should be related to Materials Science and Engineering and must be approved by the DMSE graduate committee
- Courses not on this list are at advisor’s discretion.

**List of Pre-approved Electives**
- 510.400 Introduction to Ceramics
- 510.403 Materials Characterization
- 510.405 Materials Physics
- 510.422 Micro- and Nano-structured Materials and Devices
- 510.426 Biomolecular Materials
- 510.428 Materials Science Laboratory I
- 510.429 Materials Science Laboratory II
- 510.430 Biomaterials Lab
- 510.431 Biocompatibility of Materials
- 510.456 Introduction to Surface Science
- 500.619 Fundamental Physics and Chemistry of Nanomaterials
- 510.604 Mechanical Properties of Materials
- 510.605 Electronic, Optical and Magnetic Properties of Materials
- 510.606 Chemical and Biological Properties of Materials
- 510.607 Biomaterials II
- 510.608 Electrochemistry
- 510.611 Solid State Physics
- 510.612 Solid State Physics
- 510.617 Advanced Topics in Biomaterials
- 510.619 Biopolymer Synthesis
- 510.620 Amorphous and Nano crystalline Metals
- 510.622 Micro- and Nano-Structured Materials and Devices
- 510.624 Theory of X-ray Diffraction
- 510.650 Principles of Quantum Physical Interactions
14. **Operations Research** *(Sponsored by the Department of Applied Mathematics & Statistics, Geography, and Environmental Engineering)*

**Prerequisites:**
- Calculus-based background in Probability and Statistics. Students wishing to strengthen their background in this area may enroll in 550.420 (Probability) and/or 550.430 Statistics, but these courses may not be used in fulfillment of this track’s requirements.

**Required Courses (3)**

*Substitutions for required courses are at the advisor’s discretion*
- 570.495 Mathematical Foundations for Public Decision Making
  
  **OR**
  - 550.661 Foundations of Optimization
  - 570.497 Risk and Decision Analysis
  - 570.608 Uncertainty Modeling for Policy & Management Decision Making
  
  **OR**
  - 550.400 Mathematical Modeling & Consulting

**Elective Courses (2)**

*Courses not on this list are at the advisor’s discretion*
- 570.493 Economic Foundations for Public Decision Making
- 570.496 Math Models/Urban System
- 570.607 Energy Planning and Policy Modeling
- 550.662 Optimization Algorithms
- 550.426 Stochastic Processes
- 550.427 Stochastic Processes in Finance
- 550.433 Monte Carlo Simulation
- 550.463 Network Models

15. **Probability and Statistics** *(Sponsored by the Department of Applied Mathematics & Statistics)*

**Prerequisites:**
- One upper-division undergraduate course in probability (equivalent to 550.420 Introduction to Probability)
- One upper-division undergraduate course in mathematical statistics (equivalent to 550.430 Introduction to Statistics)

**Required (5)**

*Any five (5) of the following courses, or an elective approved by the discretion of the faculty advisor:*
Aplied Statistics and Data Analysis
550.426 Introduction to Stochastic Processes
550.432 Linear Statistical Models
550.433 Monte Carlo Simulation and Reliability
550.434 Nonparametric and Robust Methods
550.435 Bioinformatics and Statistical Genetics
550.436 Data Mining
550.437 Information, Statistics, and Perception
550.438 Statistical Methods in Computer Intrusion Detection
550.439 Time Series Analysis
550.620 Probability Theory I
550.630 Statistical Theory I
550.631 Statistical Theory II
550.632 Multivariate Statistical Theory
550.633 Time Series Analysis
550.634 Nonparametric and Robust Inference
550.635 Topics in Bioinformatics
550.730 Topics in Statistics
550.731 Case Studies in Applied Statistics

Additional Requirements
• An overall GPA of 3.0 must be maintained in courses used to meet the program’s technical requirements
• At most two course grades of C or C+ are allowed, and the rest of the course grades must be B- or better.
• Students must satisfy the department’s graduate student computing requirement.
• With advisor’s approval, one non-departmental course containing appropriate mathematical or statistical content can count to satisfy the five-course requirement.

16. Smart Product and Device Design (Sponsored jointly by the Department of Mechanical Engineering and the Department of Electrical & Computer Engineering)

When electing a concentration in ECE, here are additional options as to what you can pursue:

1) human language technologies
2) computation and bio photonics
3) Microsystems and computer engineering
4) machine learning and artificial intelligence
5) signal processing and sensory processing

Required (3)
Substitutions for required courses are at the advisor’s discretion.
Elective Courses (2)

- 530.414 Computer-Aided Design
  OR
- 520.491 CAD of Digital VLSI Systems
- 530.421 Mechatronics
  OR
- 520.448 Electronics Design Laboratory
  OR
- 530.487 Introduction to Microelectromechanical Systems
Any two (2) related courses, approved by the faculty advisor

17. **Environmental Systems Analysis, Economics and Public Policy** *(Sponsored by the Department of Geography & Environmental Engineering)*

Required (3)
- **Economics (preferably with calculus):** This requirement may be waived by their advisor if the student has already had an intermediate microeconomics course. A list of qualifying courses is available from the advisor.
- **Mathematics of Decision Making:** 570.695 Environmental Health & Engineering Systems Design
- **Policy & Decision Making:** 570.697 Risk & Decision Analysis
  OR’ 570.607 Energy Planning & Policy Modeling

Electives (2)
*Courses not on this list are at advisor’s discretion.*
- 570.496 Mathematical Models for Managing Urban and Environmental Systems
- 570.618 Multi-objective Programming and Planning
- 570.676 Stochastic Programming
- Other courses in environmental economics, systems, or policy, as approved by the advisor.

Additional Notes
- The student’s advisor must approve all courses.
- All courses must be at the 400-level or above.
- No more than one course in environmental engineering may be used to fulfill the track and only with careful consultation with the student’s advisor.

18. **Systems Engineering** *(Sponsored by the Department of Systems Engineering)*

Required (3)
- Two courses with course numbers from EN.560.640—EN.560.659 OR choose one from both

Electives (2)
*Three courses from any combination of the following: Courses not on this list are at advisor’s discretion.*
- 560.6xx or above, or 565.4xx or above (excluding seminar)
- 645.6xx or above (EP Systems Engineering)
- 570.495 Mathematical Foundations for Public Decision Making
- 550.661 Foundations of Optimization
570.497 Risk and Decision Analysis
570.608 Uncertainty Modeling for Policy & Management Decision Making
550.400 Mathematical Modeling and Consulting
570.493 Economic Foundations For Public Decision Making
570.496 Math Models/Urban System
570.607 Energy Planning and Policy Modeling
663.653 Innovation and Entrepreneurship
663.657 Innovation and Entrepreneurship II

19. **Space Systems Engineering** *(Sponsored by the Engineering for Professionals Program)*

**Required (2)**
- 675.600 Systems Engineering for Space
- 675.601 Fundamentals of Engineering Space Systems I

**Electives (3)**
Three courses from any combination of 675.xxx
*Courses not on this list are at advisor’s discretion.*
History of MSEM at JHU

The Johns Hopkins Master of Science in Engineering Management (MSEM) Program was sent to MHEC (Maryland Higher Education Commission) in August 2008 and approved shortly thereafter. Our first students were accepted for the spring of 2009 and our first class of 13 students graduated in May 2010.

MSEM or MEM degrees are growing in popularity, but in 2009 only UMBC offered an Engineering Management degree locally. JHU MSEM was admitted to the Master of Engineering Management Programs Consortium (MEMPC) in 2016. Other members include Northwestern, Cornell, Dartmouth, Duke, Massachusetts Institute of Technology, Tufts and the University of Southern California.

In addition to our full-time, Homewood based program, the Whiting School also offers a Master’s in Engineering Management through the Engineering for Professionals School; their program is part-time for working professionals and many of their courses are on-line.

MSEM began with 12 technical tracks (formerly concentrations), and we have added several additional tracks (Systems Engineering, Cybersecurity, Space Systems Engineering). We anticipate other tracks in the future, among them Energy, BME, Computational Medicine, Electrical Engineering and Robotics.
662.643, *The Practice of Consulting*, a January Intersession program that enables students to put their management and engineering expertise to use in a real-world setting. Known in the program as the Immersion Experience, the course allows students to work intensively in teams on a client problem either in the US or abroad. Our students have worked in Baltimore, Israel, Honduras, Panama, Portugal, Spain and Denmark.
RESOURCES FOR MSEM STUDENTS

Campus Map (Homewood)
https://www.jhu.edu/maps-directions/

Counseling Center
3003 N. Charles St., Homewood Apartments, Suite S-200
https://studentaffairs.jhu.edu/counselingcenter/

Disability Services
Garland Hall Room 385
http://homewoodgrad.jhu.edu/student-services/disabilities-services-at-jhu/

Graduate & Postdoctoral Affairs (Graduate Credits)
http://homewoodgrad.jhu.edu/academics/wse-graduate-credit-hours/

Health Insurance
https://studentaffairs.jhu.edu/student-health/insurance/

Housing
https://studentaffairs.jhu.edu/community-living/offcampus/

Insurance and Fees
https://studentaffairs.jhu.edu/student-health/insurance/

International Student Offices
Garland Hall, Room 385
http://ois.jhu.edu/Contact_Us/Homewood/index.html

IT
Garland Hall basement
http://www.it.jhu.edu/

Recreation Center
Ralph S. O’Connor Recreation Center
https://studentaffairs.jhu.edu/recreation/experiential-education/trips/backpacking-hiking/

Registrar
75 Garland Hall (Basement)
https://studentaffairs.jhu.edu/registrar/

Safety & Security (410-516-7777)
3001 Remington Avenue
http://security.jhu.edu/

**JH Shuttles**
http://ts.jhu.edu/Shuttles/

**Student Accounts (Billing)**
Garland Hall, Suite B31 (Basement)
https://studentaffairs.jhu.edu/student-accounts/

**Student Employment Services**
Garland Hall, Suite 72 (Basement)
https://studentaffairs.jhu.edu/studentemployment/

**Student Health & Wellness**
1 E. 31st St
https://studentaffairs.jhu.edu/student-health

**Tax Information**
https://studentaffairs.jhu.edu/student-accounts/tax-information/

**Transportation**
http://ts.jhu.edu/Shuttles/

**Whiting School of Engineering Dean**
Dean ED Schlesinger
Wyman Park Building, 6th floor
https://engineering.jhu.edu/about/ed-schlesinger-benjamin-t-rome-dean/

**Whiting School of Engineering Asst. Dean of Graduate & Postdoc Academic Affairs**
Christine Kavanagh
Wyman Park Building, 4th floor
http://homewoodgrad.jhu.edu/

**ZIP Cars**
http://ts.jhu.edu/Services/ZipCar/
<table>
<thead>
<tr>
<th>Date</th>
<th>Event/Note</th>
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<tbody>
<tr>
<td><strong>Tuesday, August 27th, 8:00am-1:00pm</strong></td>
<td>Orientation for all Teaching Assistants</td>
</tr>
<tr>
<td><strong>Thursday, August 29th</strong></td>
<td>First day of classes&lt;br&gt;&lt;br&gt;<strong>Meet according to Monday Schedule</strong></td>
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<tr>
<td><strong>Monday, September 2nd</strong></td>
<td>Labor Day – no classes</td>
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<tr>
<td><strong>Friday, September 13th</strong></td>
<td>Last day to add courses</td>
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<tr>
<td><strong>Sunday, October 13th</strong></td>
<td>Last day to drop courses</td>
</tr>
<tr>
<td><strong>Friday, October 18th–Sunday, October 20th</strong></td>
<td>Fall Break – classes suspended</td>
</tr>
<tr>
<td><strong>Monday, November 4th</strong></td>
<td>Graduate registration for spring term</td>
</tr>
<tr>
<td><strong>Friday, November 15th</strong></td>
<td>Last day for course withdrawal&lt;br&gt;&lt;br&gt;Undergraduate's last day to change to S/U option</td>
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<tr>
<td><strong>Monday, November 25th–Sunday, December 1st</strong></td>
<td>Thanksgiving vacation</td>
</tr>
<tr>
<td><strong>Friday, December 6th</strong></td>
<td>Last day of classes</td>
</tr>
<tr>
<td><strong>Saturday, December 7th–Tuesday, December 10th</strong></td>
<td>Reading period</td>
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<tr>
<td><strong>Wednesday, December 11th–Friday, December 20th</strong></td>
<td>Final examination period</td>
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<tr>
<td><strong>Saturday, December 21st–Sunday, January 5th</strong></td>
<td>Mid-year vacation</td>
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<tr>
<td>Date</td>
<td>Event</td>
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<tr>
<td>Monday, January 6th</td>
<td>Observance of Dr. Martin Luther King, Jr. birthday; No Intersession classes</td>
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<tr>
<td>Monday, January 20th</td>
<td>First day of classes</td>
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<tr>
<td>Monday, January 27th</td>
<td>Last day to add courses</td>
</tr>
<tr>
<td>Sunday, March 8th</td>
<td>Last day to drop courses</td>
</tr>
<tr>
<td>Monday, March 16th</td>
<td>Spring vacation</td>
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<tr>
<td>Monday, April 27th</td>
<td>Graduate registration for fall term</td>
</tr>
<tr>
<td>Friday, April 17th</td>
<td>Last day for course withdrawal Undergraduate's last day to change to S/U option</td>
</tr>
<tr>
<td>Friday, May 1st</td>
<td>Last day of classes</td>
</tr>
<tr>
<td>Saturday, May 2nd</td>
<td>Reading period</td>
</tr>
<tr>
<td>Wednesday, May 6th</td>
<td>Final examination period</td>
</tr>
<tr>
<td>Thursday, May 21st</td>
<td>University Commencement</td>
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