Required Courses for Master's Degrees

Courses requirements are subject to advisor approval.

The Systems Engineering program offers two degree distinctions—a Master of Science in Engineering (MSE) and a Master of Science (MS).

In order to be admitted into the MSE program, applicants need to hold a degree issued by a program accredited by the Engineering Accreditation Commission (EAC) of ABET (https://www.abet.org/). Students admitted without a Bachelor of Science degree from an EAC of ABET-accredited program (or who did not complete the prerequisites that meet all of the EAC of ABET-accreditation requirements) will receive a regionally accredited Master of Science degree. There is no difference in the curriculum for the MSE and MS programs.

Ten courses must be completed within five years. The curriculum consists of seven or eight core courses and two or three electives, depending on whether the master’s project or the master’s thesis is selected.

Only one C-range grade (C+, C, or C–) can count toward the master’s degree. All course selections outside of the System Engineering program requirements are subject to advisor approval.

### Courses

#### Required Courses for Master's Degrees

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN.645.662</td>
<td>Introduction to Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.667</td>
<td>Management of Systems Projects</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.764</td>
<td>Software Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.767</td>
<td>System Conceptual Design</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.768</td>
<td>System Design &amp; Integration</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.769</td>
<td>System Test &amp; Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.800</td>
<td>Systems Engineering Master's Project</td>
<td>3-6</td>
</tr>
</tbody>
</table>

or

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN.645.801</td>
<td>Systems Engineering Master's Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; EN.645.802</td>
<td>Systems Engineering Master’s Thesis</td>
<td></td>
</tr>
</tbody>
</table>

#### Electives

Select three electives from one of the following tracks:

1. Systems (p. 1)
2. Cybersecurity (p. 1)
3. Human Systems (p. 1)
4. Modeling and Simulation (p. 2)
5. Project Management (p. 2)
6. Software Systems (p. 2)

1 Students who take the two-semester thesis option only select two from the list of courses by track. Other JHU/WSE courses may be accepted as electives with the approval of the student’s advisor. The tracks below represent related groups of courses that are relevant for students with interests in the selected areas.

#### Tracks

**Systems**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EN.645.631</td>
<td>Introduction to Model Based Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.632</td>
<td>Applied Analytics for Model Based Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.669</td>
<td>Systems Engineering of Deployed Systems</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.742</td>
<td>Management of Complex Systems</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.753</td>
<td>Enterprise Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.761</td>
<td>Systems Architecting</td>
<td>3</td>
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<tr>
<td>EN.645.766</td>
<td>Systems Engineering Advanced Technology</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.771</td>
<td>System of Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.780</td>
<td>Agile Systems Engineering</td>
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**Cybersecurity**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>EN.635.611</td>
<td>Principles of Network Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.635.672</td>
<td>Privacy Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.635.673</td>
<td>Protecting Critical Infrastructure Against Cyber Attacks</td>
<td>3</td>
</tr>
<tr>
<td>EN.635.676</td>
<td>Cybersecurity in Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>EN.635.682</td>
<td>Website Development</td>
<td>3</td>
</tr>
<tr>
<td>EN.635.683</td>
<td>E-Business: Models, Architecture, Technologies, and Infrastructure</td>
<td>3</td>
</tr>
<tr>
<td>EN.695.601</td>
<td>Foundations of Information Assurance</td>
<td>3</td>
</tr>
<tr>
<td>EN.695.621</td>
<td>Public Key Infrastructure and Managing E-Security</td>
<td>3</td>
</tr>
<tr>
<td>EN.695.744</td>
<td>Reverse Engineering and Vulnerability Analysis</td>
<td>3</td>
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</table>

**Human Systems**

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<tr>
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<tbody>
<tr>
<td>EN.635.661</td>
<td>Principles of Human Computer Interaction</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.621</td>
<td>Engineering and Measuring Influence</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.650</td>
<td>Foundations of Human Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.651</td>
<td>Integrating Humans and Technology</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.754</td>
<td>Social and Organizational Factors in Human Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.755</td>
<td>Methods in Human-System Performance Measurement and Analysis</td>
<td>3</td>
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</tbody>
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Applicants must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (https://engineering.jhu.edu/graduate/graduate-professionals/admission-requirements/). A minimum of one year of relevant full-time work experience in the field is required, and a detailed work résumé and transcripts from all college studies must be submitted. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. When reviewing an application, the candidate's academic and professional background will be considered.

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<tbody>
<tr>
<td>EN.625.603</td>
<td>Statistical Methods and Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.756</td>
<td>Metrics, Modeling, and Simulation for Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.757</td>
<td>Foundations of Modeling and Simulation in Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.758</td>
<td>Advanced Systems Modeling and Simulation</td>
<td>3</td>
</tr>
<tr>
<td>EN.645.780</td>
<td>Agile Systems Engineering</td>
<td>3</td>
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Project Management

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<tr>
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<tbody>
<tr>
<td>EN.595.662</td>
<td>Technical Organization Management</td>
<td>3</td>
</tr>
<tr>
<td>EN.595.665</td>
<td>Strategic Communications in Technical Organizations</td>
<td>3</td>
</tr>
<tr>
<td>EN.595.676</td>
<td>Finance, Contracts, and Compliance for Technical Professionals</td>
<td>3</td>
</tr>
<tr>
<td>EN.595.727</td>
<td>Advanced Concepts in Agile Technical Management</td>
<td>3</td>
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Software Systems

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<tr>
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</thead>
<tbody>
<tr>
<td>EN.605.604</td>
<td>Object-Oriented Programming with C++</td>
<td>3</td>
</tr>
<tr>
<td>EN.605.607</td>
<td>Agile Software Development Methods</td>
<td>3</td>
</tr>
<tr>
<td>EN.605.608</td>
<td>Software Project Management</td>
<td>3</td>
</tr>
<tr>
<td>EN.605.704</td>
<td>Object-Oriented Analysis and Design</td>
<td>3</td>
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<tr>
<td>EN.605.705</td>
<td>Software Safety</td>
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</tr>
<tr>
<td>EN.605.708</td>
<td>Tools and Techniques of Software Project Management</td>
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</table>

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Learning Outcomes

JHU Systems Engineering Program Educational Objectives

Within 2–5 years after graduation, Master of Science in Engineering in System Engineering graduates of Johns Hopkins University will:

1. Attain programmatic or technical leadership roles in systems engineering or the management of complex systems.
2. Employ systems engineering methods and tools throughout the life cycle of complex systems.

JHU Systems Engineering Student Outcomes

Upon completing the Master of Science in Engineering in Systems Engineering Program, students will be able to:

1. Apply technical knowledge in mathematics, science, and engineering to lead the realization and evaluation of complex systems and systems of systems.
2. Demonstrate the ability to conceive of, gather user needs and requirements for, design, develop, integrate, and test complex systems by employing systems engineering thinking and processes within required operational and acquisition system environments.