DEPARTMENT OF SYSTEMS ENGINEERING

Courses

SYSE 501  Foundations of Systems Engineering  Credits: 3 (3-0-0)
Course Description: Functional components of systems engineering, application of systems engineering to practical problems, system life-cycle process.
Prerequisite: None.
Registration Information: Sections may be offered: Online. Credit allowed for only one of the following: ECE 501, ENGR 501, or SYSE 501.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 505  Systems Thinking for the Real World  Credits: 3 (3-0-0)
Course Description: Application of systems thinking language, tools, and framework for solving real-world complex issues.
Prerequisite: None.
Restriction: Must be a Graduate.
Registration Information: Sections may be offered: Face-to-Face, Mixed Face-to-Face, or Online. Credit not allowed for both SYSE 505 and SYSE 580A2.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 512  Systems Sensing and Imaging Analysis  Credits: 3 (3-0-0)
Course Description: Sensing, sampling, filtering, transducing, and transmission of information to transform physical data to the digital domain. Subsequent processing of image and digital data, restoration, analysis and classification to problems in inspection, authentication, color science, biometrics, and signal/image characterization.
Prerequisite: ECE 303 or STAT 303 or STAT 315.
Registration Information: Sections may be offered: Face-to-Face, Mixed Face-to-Face, or Online. Credit not allowed for both SYSE 512 and ENGR 681A2.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 530  Overview of Systems Engineering Processes  Credits: 3 (3-0-0)
Course Description: Systems engineering life-cycle process and analysis techniques. Reliability and robustness.
Prerequisite: ECE 303 or STAT 303 or STAT 315.
Registration Information: Sections may be offered: Online. Credit allowed for only one of the following: ECE 530, ENGR 530, or SYSE 530.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 532  Dynamics of Complex Engineering Systems  Credits: 3 (3-0-0)
Also Offered As: ECE 532.
Course Description: Higher-level behavior and issues that emerge from interaction between components in complex socio-technical systems.
Prerequisite: ECE 501, may be taken concurrently or ENGR 501, may be taken concurrently or SYSE 501, may be taken concurrently.
Registration Information: Sections may be offered: Online. Credit allowed for only one of the following: ECE 532, ENGR 532, or SYSE 532.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 534  Human Systems Integration  Credits: 3 (3-0-0)
Course Description: Evaluation of human capabilities and limitations when designing and evaluating complex systems in order to enhance safety, efficiency, usability, and reduce life cycle costs.
Prerequisite: None.
Restriction: Must be a Graduate.
Registration Information: Sections may be offered: Face-to-Face, Online, or Mixed Face-to-Face. Credit not allowed for both ENGR 581A4 and SYSE 534.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 541  Engineering Data Design and Visualization  Credits: 3 (3-0-0)
Course Description: Data design, aggregation and filtering, intuitive data exploration, effective communication of patterns, summaries, and findings, and methods of archiving for engineers.
Prerequisite: ECE 303 or STAT 303 or STAT 315.
Registration Information: Sections may be offered: Face-to-Face, Mixed Face-to-Face, or Online. Credit not allowed for both ENGR 580A5 and SYSE 541.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 549  Secure Vehicle and Industrial Networking  Credits: 3 (3-0-0)
Course Description: Theoretical and practical applications of secure communications in automotive and industrial networked systems. Industry standards used to understand challenges of balancing requirements for cybersecurity and functional performance. Networks include IP networks, Ethernet, in-vehicle networks, Controller Area Networks, SAE J1939 and diagnostic systems. Coverage includes physical connections, encoding, message framing, media access control, error detection, cryptography and application security.
Prerequisite: CS 163 or CS 164.
Registration Information: Sections may be offered: Face-to-Face, Mixed Face-to-Face, or Online. Credit not allowed for both ENGR 580A6 and SYSE 549.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 567  Systems Engineering Architecture  Credits: 3 (3-0-0)
Course Description: Observation/classification of systems architecture. Systems architecture principles and critical evaluation through design studies.
Prerequisite: ECE 501 or ENGR 501 or SYSE 501.
Registration Information: Sections may be offered: Online. Credit allowed for only one of the following: ECE 567, ENGR 567, or SYSE 567.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
**SYSE 569 Cybersecurity Awareness for Systems Engineers Credits: 3 (3-0-0)**

**Course Description:** Cybersecurity principles, practices, technologies, design approaches, and terminology needed to incorporate cybersecurity principles into effective systems designs.

**Prerequisite:** ENGR 501 or SYSE 501.

**Registration Information:** Bachelor’s degree required. Sections may be offered: Online. Credit allowed for only one of the following: ENGR 569, ENGR 580A4, or SYSE 569.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

---

**SYSE 571 Analytics in Systems Engineering Credits: 3 (3-0-0)**

**Course Description:** Focus on the appropriate application of data mining, knowledge generation, data analytics and data algorithms to large complex systems. Demystify “big data” for systems engineers as applied to intelligent systems.

**Prerequisite:** None.

**Restriction:** Must be a: Graduate.

**Registration Information:** Bachelor’s degree required. Sections may be offered: Face-to-Face, Mixed Face-to-Face, or Online. Credit not allowed for both ENGR 571 and SYSE 571.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

---

**SYSE 573 Cost Optimization for Systems Engineers Credits: 3 (3-0-0)**

**Course Description:** Techniques and strategies to respond to requirements, design, development and manufacturing decisions, while optimizing for cost at the organizational, program, and project level.

**Prerequisite:** ENGR 502 and ENGR 531.

**Restriction:** Must be a: Graduate.

**Registration Information:** Sections may be offered: Face-to-Face, Online, or Mixed Face-to-Face. Credit not allowed for both ENGR 581A3 and SYSE 573.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

---

**SYSE 596 Group Study-Systems Engineering Skills Credits: Var[1-2] (0-0-0)**

**Course Description:** Topics related to building specialized skills relevant for the systems engineering field.

**Prerequisite:** None.

**Registration Information:** Bachelor’s degree required. Sections may be offered: Online.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

---

**SYSE 597 Group Study in Systems Engineering Credits: 3 (0-0-3)**

**Course Description:** Special and contemporary topics in the field of systems engineering.

**Prerequisite:** None.

**Restriction:** Must be a: Graduate.

**Registration Information:** Graduate standing. Sections may be offered: Online.

**Grade Mode:** Traditional.

**Special Course Fee:** No.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Course Description</th>
<th>Prerequisite</th>
<th>Restriction</th>
<th>Registration Information</th>
<th>Terms Offered</th>
<th>Grade Mode</th>
<th>Special Course Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSE 710</td>
<td>Leadership/Innovation in Systems Engineering</td>
<td>3 (3-0-0)</td>
<td>Course Description: Background in technical leadership skill sets, systems engineering skillsets, and intellectual toolkit to develop a successful applied and translational research project/practicum.</td>
<td>None</td>
<td>Graduate, Professional</td>
<td>Bachelor’s degree required. Sections may be offered: Online. Course is not available for credit toward the PhD in Systems Engineering. Credit not allowed for both ENGR 710 and SYSE 710.</td>
<td>Fall, Spring</td>
<td>Traditional</td>
<td>No.</td>
</tr>
<tr>
<td>SYSE 711</td>
<td>Ethics in Systems Engineering</td>
<td>1 (0-0-1)</td>
<td>Course Description: Ethical principles and their application to systems engineering.</td>
<td>ENGR 501 or SYSE 501</td>
<td>Graduate, Professional</td>
<td>Offered as an online course only. Credit not allowed for both ENGR 711 and SYSE 711.</td>
<td>Fall, Spring</td>
<td>Traditional</td>
<td>No.</td>
</tr>
<tr>
<td>SYSE 786</td>
<td>Applied Systems Engineering Practicum</td>
<td>Var[1-9] (0-0-0)</td>
<td>Course Description: Research techniques, critical thinking, evaluation criteria, and methods of technical writing.</td>
<td>ENGR 710 or SYSE 710</td>
<td>Graduate, Professional</td>
<td>Written consent of advisor.</td>
<td>Fall, Spring, Summer</td>
<td>S/U Sat/Unsat Only</td>
<td>No.</td>
</tr>
<tr>
<td>SYSE 795</td>
<td>Independent Study</td>
<td>Var[1-18] (0-0-0)</td>
<td>Course Description:</td>
<td>None</td>
<td>Graduate, Professional</td>
<td>Sections may be offered: Online.</td>
<td>Fall, Spring, Summer</td>
<td>S/U Sat/Unsat Only</td>
<td>No.</td>
</tr>
<tr>
<td>SYSE 799B</td>
<td>Dissertation: Professional Doctorate</td>
<td>Var[1-9] (0-0-0)</td>
<td>Course Description: Dissertation for PhD in System Engineering Program.</td>
<td>SYSE 786</td>
<td>Graduate, Professional</td>
<td>Written consent of advisor. Sections may be offered: Online.</td>
<td>Fall, Spring, Summer</td>
<td>S/U Sat/Unsat Only</td>
<td>No.</td>
</tr>
</tbody>
</table>