APPROVED TECHNICAL ELECTIVES FOR CYBER SECURITY ENGINEERS

Twenty-one (21) semester credit hours of Technical Electives are required. **Courses not on these lists may be counted as Technical Electives only if they are approved by the Curriculum Committee.** A written request must be submitted and approved before the course is taken. **NO Graduate or Undergraduate Seminars** are allowed for Technical Elective credit. Graduate Special Topics courses require ECpE Curriculum Committee review.

- Three (3) credits must be from the list of CprE electives
- Twelve (12) credits must be taken from the list of Cyber Security electives
- Six (6) credits can be taken from any of the lists below

**IMPORTANT NOTATIONS (Please Read):**

1. * Course is cross-listed (same course). Can only apply one towards graduation EE, CprE, SE, or ComS
2. Only one course either MatE 273 or MatE 392 may be applied as a technical elective
3. Math 489 & ME 484 are not allowed as EE or Non-EE Technical Electives - They can be used as a general education course.
4. ENGR/EE/CprE 467, EE 442 & EE 448 **cannot** be used to fulfill any elective requirements.
5. EE 351 and EE 388 may be used to fulfill International Perspective requirements - You must choose if you want the course applied to either a general education or technical elective requirement, but not both
6. ENGR/EE/CprE 467, EE 442 & EE 448 **cannot** be used to fulfill any elective requirements
7. ENV S 324 (cross-listed with ENSCI, GEOL, MTEOR) -You must choose if you want the course applied to either a general education OR technical elective requirement but not both
8. A maximum of 2 credits of EE/CprE/CybE/SE 490, Independent Study can be applied towards technical electives

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### Math Elective (3/4 cr.)

<table>
<thead>
<tr>
<th>COURSES</th>
<th>DESCRIPTION</th>
<th>CR</th>
<th>PREREQS (Check latest catalog for complete lists)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Math 207</td>
<td>Matrices and Linear Algebra</td>
<td>3</td>
<td>2 semesters of calculus</td>
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<tr>
<td>Math 265</td>
<td>Calculus III</td>
<td>4</td>
<td>Minimum of C- in Math 166 or 166H</td>
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<tr>
<td>Math 304</td>
<td>Combinatorics</td>
<td>3</td>
<td>Math 166; Math 201</td>
</tr>
<tr>
<td>Math 314</td>
<td>Graph Theory</td>
<td>3</td>
<td>Math 166; Math 201</td>
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<tr>
<td>*Math 317</td>
<td>Theory of Linear Algebra</td>
<td>4</td>
<td>Cr or enrollment in Math 201</td>
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### Cyber Security Engineering Electives (12 cr.)

<table>
<thead>
<tr>
<th>COURSES</th>
<th>DESCRIPTION</th>
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<th>PREREQS (Check latest catalog for complete lists)</th>
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<tbody>
<tr>
<td>CprE 430*</td>
<td>Network Protocols and Security</td>
<td>3</td>
<td>CprE 308 or ComS 252 or 352</td>
</tr>
<tr>
<td>CprE 436x*</td>
<td>Digital Forensics</td>
<td>3</td>
<td>CprE 331</td>
</tr>
<tr>
<td>CprE 437x*</td>
<td>Introduction to Wireless Security</td>
<td>3</td>
<td>CprE 331 or CprE 430</td>
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<tr>
<td>CprE 440*</td>
<td>Operating System Security</td>
<td>3</td>
<td>CprE 308 or ComS 352</td>
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<tr>
<td>CybE 531*</td>
<td>Information System Security</td>
<td>3</td>
<td>CprE 489 or CprE 530 or ComS 586 or MIS 535</td>
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<tr>
<td>CybSc 532*</td>
<td>Information Warfare</td>
<td>3</td>
<td>CprE 430 or 530</td>
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<td>CybSc 533*</td>
<td>Cryptography</td>
<td>3</td>
<td>CprE 310</td>
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<tr>
<td>CybSc 535*</td>
<td>Steganography and Digital Image Forensics</td>
<td>3</td>
<td>EE 524 or Math 317 or Math 407 or ComS 230</td>
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<tr>
<td>CybSc 536*</td>
<td>Computer and Network Forensics</td>
<td>3</td>
<td>CprE 489 or CprE 530</td>
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<tr>
<td>CybSc 538*</td>
<td>Reverse Engineering and Security Testing</td>
<td>3</td>
<td>CprE 381; CprE 308</td>
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<tr>
<td>SE 421*</td>
<td>Software Analysis &amp; Verification for Safety &amp; Security</td>
<td>3</td>
<td>ComS 309; CprE 310</td>
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<tr>
<td>COURSES</td>
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<tr>
<td>CprE 329*</td>
<td>Software Project Management</td>
<td>3</td>
<td>ComS 309</td>
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<tr>
<td>CprE 330*</td>
<td>Integrated Electronics</td>
<td>4</td>
<td>EE 201, Cr/E EE 230, CprE 281</td>
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<tr>
<td>CprE 339*</td>
<td>Software Architecture &amp; Design</td>
<td>3</td>
<td>SE 319</td>
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<tr>
<td>CprE 388</td>
<td>Embedded Systems II: Mobile Platforms</td>
<td>4</td>
<td>CprE 288</td>
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<tr>
<td>CprE 412*</td>
<td>Formal Methods in Software Engineering</td>
<td>3</td>
<td>Com S 311, Stat 330</td>
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<tr>
<td>CprE 414</td>
<td>Introduction to Software Systems for Big Data Analytics</td>
<td>4</td>
<td>ComS 363; CprE 315 or 308; Com S 311 or 352</td>
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<tr>
<td>CprE 416*</td>
<td>Software Evolution and Maintenance</td>
<td>3</td>
<td>ComS 309</td>
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<tr>
<td>CprE 418*</td>
<td>High Speed Sys. Engr. Meas. &amp; Test.</td>
<td>4</td>
<td>EE 230, EE 311</td>
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<tr>
<td>CprE 419*</td>
<td>Software Tools for Large Scale Data Analysis</td>
<td>4</td>
<td>CprE 308, ComS 228</td>
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<tr>
<td>CprE 421*</td>
<td>Software Analysis &amp; Verification for Safety &amp; Security</td>
<td>3</td>
<td>ComS 309; CprE 310 or ComS 230</td>
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<tr>
<td>CprE 424*</td>
<td>Introduction to High Performance Computing</td>
<td>3</td>
<td>Math 265; Math 207 or Math 317</td>
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<tr>
<td>CprE 425*</td>
<td>High Performance Computing for S &amp; E Apps</td>
<td>3</td>
<td>ComS 311, Engl 250, SpCm 212</td>
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<tr>
<td>CprE 426*</td>
<td>Intro to Parallel Algorithms and Program.</td>
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<td>CprE 308 or ComS 321, ComS 311</td>
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<tr>
<td>CprE 430</td>
<td>Network Protocols and Security</td>
<td>3</td>
<td>CprE 308 or Com S 252 or ComS 352</td>
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<tr>
<td>CprE 435*</td>
<td>Analog VLSI Circuit Design</td>
<td>4</td>
<td>EE 330</td>
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<tr>
<td>CprE 440*</td>
<td>Operating System Security</td>
<td>3</td>
<td>CprE 308 or ComS 352</td>
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<tr>
<td>CprE 444*</td>
<td>Introduction to Bioinformatics</td>
<td>4</td>
<td>Math 165 or Stat 401 or equivalent</td>
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<tr>
<td>CprE 450</td>
<td>Distributed Systems &amp; Middleware</td>
<td>3</td>
<td>CprE 308 or ComS 352</td>
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<tr>
<td>CprE 454*</td>
<td>Distributed &amp; Network Operating Systems</td>
<td>3</td>
<td>ComS 311, CprE 308</td>
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<tr>
<td>CprE 458</td>
<td>Real-Time Systems</td>
<td>3</td>
<td>CprE 308 or ComS 352</td>
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<tr>
<td>CprE 459x*</td>
<td>Security &amp; Privacy in Cloud Computing</td>
<td>3</td>
<td>CprE 308</td>
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<td>CprE 465*</td>
<td>Digital VLSI Design</td>
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<tr>
<td>CprE 480</td>
<td>Graphics Processing and Architecture</td>
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<td>CprE 381 or ComS 321</td>
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<td>CprE 487</td>
<td>Hardware Design for Machine Learning</td>
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<td>CprE 381 or Com S 321</td>
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<td>CprE 488</td>
<td>Embedded Systems Design</td>
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<td>CprE 381 or ComS 321</td>
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<tr>
<td>CprE 489</td>
<td>Computer Networking &amp; Data Comm</td>
<td>4</td>
<td>CprE 288 or ComS 327</td>
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### COURSES

<table>
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<tr>
<th>COURSES</th>
<th>DESCRIPTION</th>
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<th>PREREQGS (Check latest catalog for complete lists)</th>
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<tr>
<td>AerE 494</td>
<td>M2I</td>
<td>1-3</td>
<td>ArtIS 308 (see adviser for form)</td>
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<td>ArtIS 408</td>
<td>Principles of 3D Animation</td>
<td>3</td>
<td>ArtIS 308 (see adviser for form)</td>
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<td>ArtIS 409</td>
<td>Computer/Video Game Design &amp; Dvmt</td>
<td>3</td>
<td>ComS 227, 228; Artis 230 &amp; 308</td>
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<tr>
<td>Astro 342</td>
<td>Introduction to Solar System Astronomy</td>
<td>3</td>
<td>Phys 232 &amp; 232L</td>
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<td>Astro 344L</td>
<td>Astronomy Laboratory</td>
<td>3</td>
<td>Phys 232 &amp; 232L</td>
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<tr>
<td>Astro 346</td>
<td>Introduction to Astrophysics</td>
<td>3</td>
<td>Phys 232 &amp; 232L</td>
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<td>Astro 405</td>
<td>Astrophysical Cosmology</td>
<td>3</td>
<td>Astro 346</td>
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<tr>
<td>BME 220</td>
<td>Introduction to Biomedical Engineering</td>
<td>3</td>
<td>Biol 212, ENGR 160 or equiv, Math 166, Chem 167 or 177, Phys 232 &amp; 232L</td>
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<tr>
<td>Biol 211</td>
<td>Principles of Biology I</td>
<td>3</td>
<td>HS Biol</td>
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<td>Biol 211L</td>
<td>Principles of Biology I Lab</td>
<td>1</td>
<td>Credit or enrollment in Biol 211</td>
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<td>Biol 212</td>
<td>Principles of Biology II</td>
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<td>HS Biol; HS Chem or Cr/E in Chem 163/177</td>
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<tr>
<td>Biol 212L</td>
<td>Principles of Biology II Lab</td>
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<td>Credit or enrollment in Biol 212</td>
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<td>C E 274</td>
<td>Statics of Engineering</td>
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<td>Phys 231 &amp; 231L; Co-req Math 166</td>
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<tr>
<td>ConE 241</td>
<td>Construction Materials &amp; Methods</td>
<td>3</td>
<td>CprE 185 or ComS 207 or 227</td>
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<tr>
<td>Com S 252</td>
<td>Linux Operating System Essentials</td>
<td>3</td>
<td>Completion of Basic Program</td>
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<tr>
<td>EE 201</td>
<td>Electric Circuits</td>
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<td>Phys 231 &amp; 231L; Co-req Math 267</td>
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<td>EE 230</td>
<td>Electronic Circuits &amp; Systems</td>
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<td>EE 201; Math 267</td>
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<td>ENV S 324</td>
<td>Energy &amp; The Environment</td>
<td>3</td>
<td>Chem 167 or 177</td>
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<tr>
<td>MatE 273</td>
<td>Principles of Materials Science &amp; Engr</td>
<td>3</td>
<td>Chem 167 or Chem 177, Math 165</td>
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<tr>
<td>ME 231</td>
<td>Engineering Thermodynamics I</td>
<td>3</td>
<td>Math 166; Chem 167; Phys 231 &amp; 231L</td>
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<tr>
<td>ME 273x</td>
<td>Science and Practice of Brewing</td>
<td>3</td>
<td>Chem 167 or 177 and Phys 231 or Biol 211 or 212</td>
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<tr>
<td>Mteor 342</td>
<td>Atmospheric Physics II</td>
<td>3</td>
<td>Mteor 341</td>
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<tr>
<td>Mteor 435</td>
<td>Radar Applications in Meteorology</td>
<td>3</td>
<td>Credit or enrollment in MTEOR 341</td>
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<td>NS 320</td>
<td>Naval Ship Systems I - Engineering</td>
<td>3</td>
<td>Phys 231; Phys 231L; Sophomore</td>
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<tr>
<td>NS 330</td>
<td>Naval Ship Systems II - Weapons</td>
<td>3</td>
<td>Phys 231, Sophomore</td>
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<tr>
<td>Phys 232</td>
<td>Classical Physics II</td>
<td>4</td>
<td>Phys 231</td>
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<td>Phys 232L</td>
<td>Classical Physics II Lab</td>
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<td>credit or enrollment in Phys 232</td>
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<tr>
<td>Stat 231</td>
<td>Probability &amp; Statistical Inference for Engr</td>
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<td>Cr/E in Math 265</td>
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<tr>
<td>Stat 322*</td>
<td>Probabilistic Methods for Elec. Engineers</td>
<td>3</td>
<td>EE 224</td>
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