



Bachelor of Science in
Computer Engineering

Advising Brochure
2018 – 2019

Department of
Computer Science & Engineering
College of Engineering
256 Avery Hall

cseadvising@unl.edu
<http://cse.unl.edu/advising>

The B.S. Degree in Computer Engineering is accredited
by the Engineering Accreditation Commission of ABET.
<http://www.abet.org>

rev: June 11, 2018

Computer Engineering Program – 126 hours

| Course | Title | RAIK | Hrs |
|---|--|-----------------|------------|
| Computer Science & Engineering Courses: | | | |
| CSCE 10, ENGR 20 | Frosh & Soph Seminars | | 0 |
| CSCE 155, 156 | Intro to Comp Sci I,II | 183,184 | 3,4 |
| CSCE 230 | Computer Organization | | 4 |
| CSCE 235 | Introduction to Discrete Struct | (283) | 3 |
| CSCE 236/ECEN 220 | Intro to Embedded Systems | | 3 |
| CSCE 251 | Unix Programming | | 1 |
| CSCE 310 | Data Structures & Algos | 283 | 3 |
| CSCE 335/ECEN 370 | Digital Logic Design | | 3 |
| CSCE 351 | Operating System Kernels | | 3 |
| CSCE 361 | Intro to Software Engineering | 383 | 3 |
| CSCE 440 | Numerical Analysis I | | 3 |
| CSCE 462 | Communication Networks | | 3 |
| CSCE 488/401 | (or ECEN 494) Senior Design I | 401 | 3 |
| CSCE 489/402 | (or ECEN 495) Senior Design II | 402 | <u>3</u> |
| | | | 42 |
| Electrical Engineering Courses: | | | |
| ECEN 215, 235 | Electronics & Circuits I, Lab | | 4 |
| ECEN 216, 236 | Electronics & Circuits II, Lab | | 4 |
| ECEN 304 | Cont Time Signals & Systems | | 3 |
| ECEN 305 | Probability Theory | 270,370 | 3 |
| ECEN 316 | Electronics & Circuits III | | <u>3</u> |
| | | | 17 |
| Mathematics Courses: | | | |
| MATH 106, 107, 208 | Calc I,II,III | | 13 |
| MATH 221 | Differential Equations | | 3 |
| MATH 314 | Linear Alg (Matrix Theory) | | <u>3</u> |
| | | | 19 |
| Additional Supporting Courses: | | | |
| Natural Sciences: | | | 12-13 |
| PHYS 211, 212 and one of CHEM 109 or PHYS 213 & lab | General Physics I,II (8 hr) General Chemistry (4 hr) or General Physics III & any lab (5 hr) | | |
| Technical Communications: | | | 6-9 |
| one of JGEN 200 or ENGL 254 | Tech Comm I (subst ENGL 150+151) Writing & Communities | 287/8 | |
| one of JGEN 300 or COMM 286 or ENGR 100 | Tech Comm II or Bus & Prof Comm or Interpersonal Skills for Engr (3 hr) | 187/8 | |
| Technical Electives: | CSCE/ECEN/RAIK | 370,371,403,404 | 15 |
| ACE Courses: | LO's 5, 6, 7, 9 | (LO 6): 182,282 | 12 |
| Open Elective: | (to reach 126 hours) | | <u>0-3</u> |
| | | | 48 |

Professional Admission to Computer Engineering

- After 43-61 hours, typically end of Sophomore year
- 2.400+ previous semester and cumulative GPA
- C min in ECEN 215, C+ min in CSCE 230 and 310 (RAIK 283H)
- Automatic for qualifying students, will be contacted if at risk

Technical Electives Requirements - 15 hours

Technical Electives include the following:

- any Focus course
- any 300+ level non-required CSCE excepting 390 and 490
- any 300+ level non-required ECEN
- any 300+ level RAIK (if equivalent to qualifying CSCE)

Technical Electives constraints:

- I. ≥ 9 hours of CSCE and/or equivalent RAIK
 - II. ≥ 6 hours lecture-based
 - III. ≤ 6 hours practicum/internship (e.g. CSCE 403H, 404H, 491)
 - IV. ≤ 3 hours independent study (e.g. CSCE 498)
 - V. ≥ 9 hours 400-level
- 9+ hours in one Focus area with minimum C grade qualifies as a **Focus**.
 - 15+ hours in one Focus area with minimum C grade qualifies for waiver of preceding Technical Electives constraints.

ACE Student Learning Outcomes - 12 hours

- Maximum of 9 hrs in any one department for ACE 4-10.
- Asterisk (*) and **bold** indicates those not built into the major.
- See <http://ace.unl.edu/> for details and listings.

| | | |
|-----|---------------------------|---|
| 1. | Written Communication | JGEN 200, ENGL 150+151, 254, Raikes |
| 2. | Oral Communication | ENGR 100, COMM 286, JGEN 300, Raikes |
| 3. | Math & Computation | CSCE 155E, Raikes |
| 4. | Natural Sciences | CHEM 109, PHYS 211/212 |
| 5.* | Humanities/History | on your own! |
| 6.* | Social Sciences | on your own! or Raikes |
| 7.* | Fine Arts | on your own! |
| 8. | Ethics | CSCE 488, RAIK 401H, but NOT ECEN 494! |
| 9.* | Human Diversity | on your own! |
| 10. | Integrated Knowledge | CSCE 489, RAIK/CSCE 402, ECEN 495 |

Computer Engineering Focus Areas - 9-15 hours

Embedded Systems and Robotics

| | | |
|------|------------|-----------------------------------|
| CSCE | 430 | Computer Architecture |
| | <u>436</u> | <u>Embedded Systems</u> |
| | 438 | Sensor Networks |
| | 439 | Robotics: Algos & Appls OR |
| | 460 | Software Engr for Robotics |
| | 454 | Human-Robot Interaction |
| | 476 | Intro AI |
| ECEN | 474 | Digital Systems |
| MECH | 453 | Robotics: Kinematics & Design |

VLSI Design

| | | |
|-------------|------------|---|
| ECEN | 416 | Mat & Dev for Comp Mem/Log/Disp |
| | 421 | Princ of Semiconductor Mat & Def |
| | 475 | Digital Systems |
| CSCE | 430 | Computer Architecture |
| <u>ECEN</u> | <u>470</u> | <u>Digital & Analog VLSI Design</u> (Phys 213/223 also required) |

Signal Processing & Communications

| | | |
|------|-----|-------------------------------------|
| ECEN | 462 | Communication Systems |
| | 463 | Digital Signal Processing |
| | 464 | Digital Communication Systems |
| | 465 | Intro to Data Compression |
| CSCE | 438 | Sensor Networks |
| | 458 | Molecular & Nanoscale Communication |
| | 459 | Genetically Engineering Systems |
| | 463 | Data and Network Security |
| | 465 | Wireless Communication Networks |
| | 472 | Digital Image Processing |
| | 473 | Computer Vision |

High Performance Computing

| | | |
|-------------|------------|-----------------------------------|
| <u>CSCE</u> | <u>430</u> | <u>Computer Architecture</u> |
| | 435 | Cluster & Grid Computing |
| | 437 | File & Storage Systems |
| | 455 | Distributed Operatings Systems |
| | 456 | Parallel Algorithms & Programming |

- The Focus is optional and can be customized.
- Grade of C or higher is required for a Focus.
- Underlining means course is required for the Focus.

Computer Science Technical Electives

| | | Course Title |
|------|------|---|
| CSCE | 322 | Programming Language Concepts |
| | 378 | Human-Computer Interaction |
| | 399H | Honors Research (Ind Study) |
| | 411 | Data Modeling for System Design |
| | 412 | Data Visualization |
| | 413 | Database Systems |
| | 421 | Foundations of Constraint Satisfaction Th |
| | 423 | Design & Analysis of Algorithms |
| | 425 | Compiler Construction |
| | 428 | Automata, Computation and Formal Lang |
| | 430 | Computer Architecture |
| | 435 | Cluster & Grid Computing |
| | 436 | Advanced Embedded Systems |
| | 438 | Sensor Networks |
| | 439 | Robotics |
| | 447 | Numerical Analysis II |
| | 451 | Operating System Principles |
| | 454 | Human-Robot Interaction |
| | 455 | Distributed Operating Systems |
| | 456 | Parallel Algo's and Programming |
| | 457 | Systems Administration |
| | 458 | Molecular & Nanoscale Communication |
| | 459 | Genetically Engineered Systems |
| | 460 | Software Engr for Robotics |
| | 461 | SOFT Adv Topics in Soft Engr |
| | 463 | Data & Network Security |
| | 464 | Internet Systems & Programming |
| | 465 | Wireless Communication Networks |
| | 466 | SOFT Software Design and Arch |
| | 467 | SOFT Testing, Verif and Anal |
| | 468 | SOFT Req Elic, Modl and Anal |
| | 470 | Computer Graphics |
| | 471 | Bioinformatics |
| | 472 | Digital Image Processing |
| | 473 | Computer Vision |
| | 474 | Data Mining |
| | 475 | Multiagent Systems |
| | 476 | Artificial Intelligence |
| | 477 | Cryptography & Comp Security |
| | 478 | Machine Learning |
| | 479 | Deep Learning |
| | 491 | Internship (practicum) |
| | 493 | ILab Project (practicum) |
| | 496 | Special Topics (varies) |
| | 498 | Computer Problems (Ind Study) |

Electrical Engineering Technical Electives

| Opt | ECEN | Course Title |
|---------|------|------------------------------------|
| | 306 | Electromag Field Theory |
| | 307 | Elect Engr Lab I |
| | 317 | Elect Engr Lab 2 |
| EPS | 338 | Intro Power & Energy Systems |
| ECN | 361 | Adv Electronics & Circ |
| | 399H | Undergraduate Research (Ind Study) |
| eps | 406 | Power Systems Analysis |
| EFO | 408 | Engineering Electromagnetics |
| csp | 410 | Multivariate Random Processes |
| mat | 417 | Semiconductor Fundamentals II |
| mat | 420 | Plasma Semiconductors |
| MAT | 421 | Principles of Semiconductors |
| EPS | 428 | Power Electronics |
| eps | 430 | Wind Energy |
| eps | 436 | Electric Machines |
| mod | 448 | Decision Analysis |
| BIO | 450 | Bioinformatics |
| CSP+ecn | 462 | Communication Systems |
| CSP | 463 | Digital Signal Processing |
| csp+TCM | 464 | Digital Communication Systems |
| csp | 465 | Intro Data Compression |
| ecn | 469 | Analogue Integrated Circuits |
| ecn | 470 | Digital & Analogue VLSI Design |
| ECN | 474 | Digital Systems |
| efo | 480 | Lasers & Laser Applications |
| efo | 486 | Applied Photonics |
| | 498 | Special Topics |

Electrical Engineering Dual Matriculation?

| Include the Following Courses: | additional hrs |
|--|----------------|
| Two of CHEM 109, PHYS 213, LIFE 120/121 | 4 |
| PHYS 222, ECEN 306, 307, 317 | 8 |
| EE Option 12 hrs from above ECEN list (Need 3 hr UPPER case, 3 hr EiThEr case, 3 hr alternate Option, 3 hr any upper EE) | 6 |

Electrical Engineering Major Options

| | | |
|---------|---|------------------------------------|
| CSP/csp | - | Communications & Signal Processing |
| EFO/efo | - | Electromagnetic Fields & Optics |
| ECN/ecn | - | Electronics |
| EPS/eps | - | Energy & Power Systems |
| MAT/mat | - | Materials & Devices |
| BIO/bio | - | Bioengineering |
| MOD/mod | - | Modeling & Simulation |
| TCM/tcm | - | Telecommunication |

Recent CSCE 496 Special Topics Electives

Title

Algorithms - Large Scale Data
AI and Heuristics in Software Engr
Computational Methods in Bioinformatics
Data Visualization
Exploring Virtual Reality
Multiway Data Analysis
Performance Optimztn Comp System&Netwk
Real-Time Systems
Queuing Models
Self-Managing Computer Systems

Computer Science Dual Matriculation?

Add the Following Courses (need 150 hours): hrs

| | |
|--|----------|
| CSCE 322 as a Technical Elective | 0 |
| CSCE 423 or 428 as a Technical Elective | 0 |
| CDR A (a second ACE 1) or ENGL 150 & 151 | 3 |
| CDR C (Hum/Hist) | 3 |
| CDR D (Soc Sci) | 3 |
| | <u>9</u> |

Engineering Mathematics Minor?

The minor includes MATH 106, 107, 208, 221 plus 12 advanced hours. Computer Engineering already includes MATH 314 and MATH 440 (cross-listed as CSCE 440). Simply add two more math courses.

Recent Changes

Fall 2009 through Fall 2010: ACE General Studies formula replaced the old ES/IS. Technical Electives were 9 hours. Required courses CSCE 430, ECEN 307, 361, and 475 become electives in Fall 2011. CSCE 236 not yet created.

Fall 2011: Required courses reduced, CSCE 236 added, Technical Elective hours increased to 15. Technical Electives not restricted by type (ECEN, Raikes, etc.) but ECEN limited to only 8 courses that were most relevant, also a few theory oriented CSCE courses were not allowed.

Fall 2012 through present: Technical Elective hours now constrained by type, but choices expand to virtually any upper-level ECEN and CSCE courses.

Fall 2014: Zero credit hour CSCE 10 Orientation added to requirements.

Bulletin year defaults to year matriculated into the program. Updating to a more recent year (of matriculation) can be done. Make request through Chief Undergraduate Adviser to the Dean's Office.

Example Eight Semester Schedule - 126 hours

| | | | | | | | |
|---------------|---------|---------------|-----------|-----------------|---------|-------------|-----------|
| Fall 1 | | | | Spring 1 | | | |
| CSCE | 155E | CS I | 3 | CSCE | 156 | CS II | 4 |
| MATH | 106 | Calc I | 5 | CSCE | 235 | Discrete | 3 |
| PHYS | 211 | Gen Phys I | 4 | CSCE | 251 | Unix | 1 |
| | | ACE 5 | 3 | MATH | 107 | Calc II | 4 |
| CSCE | 10 | Seminar | 0 | PHYS | 212 | Gen Phys II | 4 |
| | | | <u>15</u> | | | | <u>16</u> |
| Fall 2 | | | | Spring 2 | | | |
| CSCE | 230 | Comp Org | 4 | CSCE | 236 | Intr Em Sys | 3 |
| CSCE | 310 | Algos | 3 | CSCE | 361 | Soft Engr | 3 |
| MATH | 208 | Calc III | 4 | MATH | 221 | Diff Eq | 3 |
| ECEN | 215,235 | Elec Circ I | 4 | ECEN | 216,236 | Circuit II | 4 |
| ENGR | 020 | Seminar | 0 | JGEN | 200 | Tech Comm I | 3 |
| | | | <u>15</u> | | | | <u>16</u> |
| Fall 3 | | | | Spring 3 | | | |
| CSCE | 351 | Op Sys Ker | 3 | CSCE | 335 | Dig Logic | 3 |
| CHEM | 109 | Gen Chem | 4 | CSCE | 462 | Comm Net | 3 |
| ECEN | 304 | Sig & Sys | 3 | MATH | 314 | Linear Alg | 3 |
| ECEN | 316 | Circuit III | 3 | ECEN | 305 | Prob Th | 3 |
| | | ACE 6 | 3 | CS/EE | | Tech Elec | 3 |
| | | | <u>16</u> | | | | <u>15</u> |
| Fall 4 | | | | Spring 4 | | | |
| CSCE | 440 | Num Anal | 3 | CSCE | 489 | CE Sr Des | 3 |
| CS/EE | | Tech Elec | 3 | CS/EE | | Tech Elec | 3 |
| CSCE | 488 | CE Prof | 3 | CS/EE | | Tech Elec | 3 |
| JGEN | 300 | Tech Comm II | 3 | CS/EE | | Tech Elec | 3 |
| | | ACE 7 | 3 | | | ACE 9 | 3 |
| | | free elective | 3 | | | | <u>15</u> |
| | | | <u>18</u> | | | | |

Department Advising:

<http://cse.unl.edu/undergraduate-advising-center>

Charles Riedesel (Faculty Advisor CSE) 259 Avery, 472-3486, chuckr@unl.edu
(calendar at <http://cse.unl.edu/~riedesel> follow link to appointments)

David McCreight (Faculty Advisor EE) 229N Scott Engr,
david.mccreight@unl.edu

Kasey Juel (College Advisor) W204 Nebraska Hall, 472-3160, kjuel@unl.edu

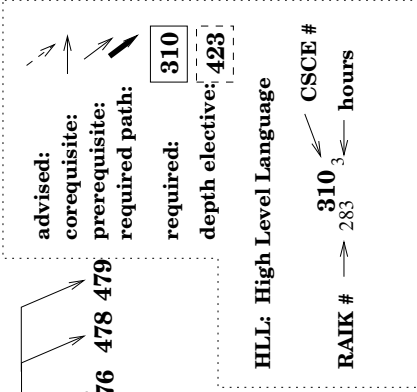
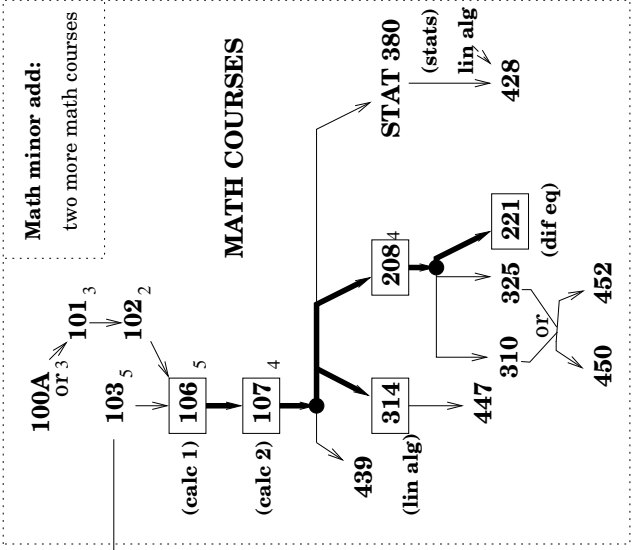
General College Advising:

Engineering Library, W204 Nebraska Hall, 472-7072

<http://engineering.unl.edu/current-undergraduate/index.shtml>

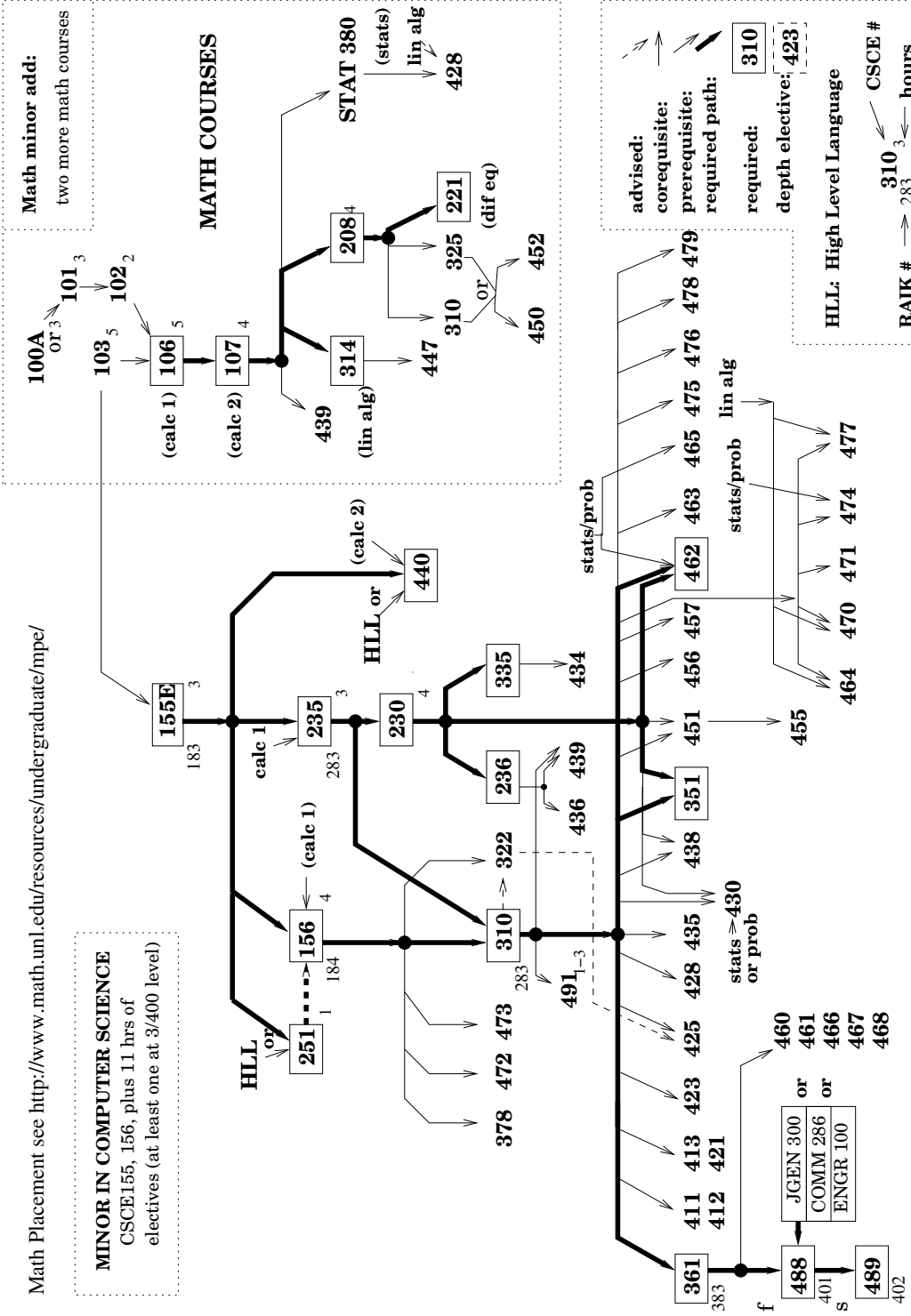
Math Placement see <http://www.math.unl.edu/resources/undergraduate/mpe/>

MINOR IN COMPUTER SCIENCE
CSCE155, 156, plus 11 hrs of
electives (at least one at 3/400 level)



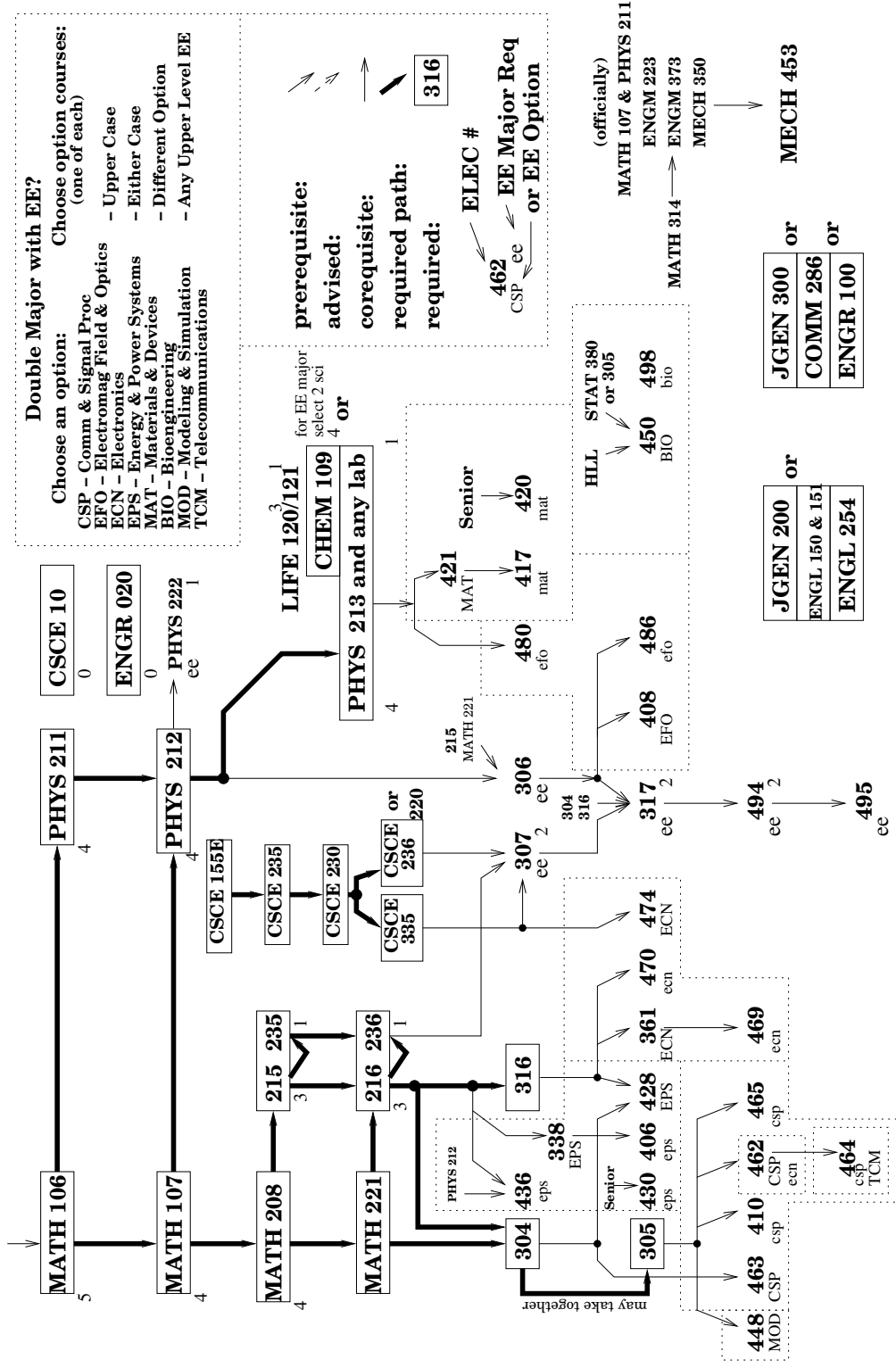
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MINOR IN COMPUTER SCIENCE
CSCE155, 156, plus 11 hrs of
electives (at least one at 3/400 level)



COMPUTER ENGINEERING PROGRAM

Computer Science & Engineering and Supporting Courses



COMPUTER ENGINEERING PROGRAM

Electrical Engineering and Supporting Courses

rev 06/11/2018