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Changes proposed by: Erhan Kudeki

Catalog Pages Using this Program	Computer Engineering, BS

Proposal Type:

In Workflow

1. **U Program Review**
2. **1933 Head**
3. **KP Committee Chair**
4. **KP Dean**
5. **University Librarian**
6. **Provost**
7. **Senate EPC**
8. Senate
9. U Senate Conf
10. Board of Trustees
11. IBHE
12. HLC
13. DMI

Approval Path

1. 01/05/22 2:30 pm
   Deb Forgacs (dforgacs): Approved for U Program Review
2. 01/05/22 4:55 pm
   Erhan Kudeki (erhan): Approved for 1933 Head
3. 02/03/22 11:39 am
   Brooke Newell (bsnewell): Approved for KP Committee Chair
4. 02/03/22 11:47 am
   Candy Deaville (candyd): Approved for KP Dean
5. 02/03/22 11:54 am
   John Wilkin

(jpwilkin): Approved for University Librarian
6. 02/03/22 4:15 pm Kathy Martensen (kmartens): Approved for Provost

History

1. Apr 24, 2019 by Deb Forgacs (dforgacs)
2. Aug 12, 2019 by Deb Forgacs (dforgacs)
3. Feb 26, 2020 by Brooke Newell (bsnewell)
4. Mar 31, 2020 by Deb Forgacs (dforgacs)
5. Apr 14, 2020 by Deb Forgacs (dforgacs)
6. Apr 19, 2021 by Erhan Kudeki (erhan)
7. May 10, 2021 by Deb Forgacs (dforgacs)
8. Nov 17, 2021 by Erhan Kudeki (erhan)

Major (ex. Special Education)

This proposal is for a:
Revision

Administration Details

Official Program Name	Computer Engineering, BS
Sponsor College	Grainger College of Engineering

Sponsor Department	Electrical and Computer Engineering
Sponsor Name	Erhan Kudeki
Sponsor Email	erhan@illinois.edu
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College Budget Officer	Tessa Hile
College Budget Officer Email	tmhile@illinois.edu

List the role for rollbacks (which role will edit the proposal on questions from EPC, e.g., Dept Head or Initiator) and/or any additional stakeholders. *Purpose: List here who will do the editing work if proposal needs rolled back. And any other stakeholders.*

Brooke Newell, Erhan Kudeki

Does this program have inter-departmental administration?

No

Proposal Title

Effective Catalog Term	Fall 2022

Provide a brief, concise description (not justification) of your proposal.

Removed Liberal Education Electives (6 hours), updated number of free elective hours (from 12 to 16), moved footnotes (when possible) into the Program of Study Table (to improve accessibility), updated number of technical elective hours (from 29 to 30), and added 4 new courses to technical electives.

List here any related proposals/revisions and their keys. *Example: This BS proposal (key 567) is related to the Concentration A proposal (key 145) and the Concentration B proposal (key 203).*

Program Justification

Why are these changes necessary?

After careful analysis of programs of studies, various requirements, and course selection for students in The Grainger College of Engineering, we have decided to provide additional flexibility to all engineering undergraduate students by increasing the number of free elective hours in all engineering programs. While the actual number of credit hours for free electives varies by program, within the college - 8 programs currently provide only 6 credit hours for free electives while an additional 2 have less than 10 - only 4 programs have more than 10 free elective credits. This lack of free elective credit hours limits students' abilities to efficiently pursue minors, certificates, and other educational opportunities and potentially limits those opportunities only to students coming in with significant AP credit or similar.

The additional free elective credit hours added to the program of study are obtained through the removal of The Grainger College of Engineering's Liberal Education requirement, which required engineering students to take an additional 6 credit hours above-and-beyond the campus' General Education requirement from the Humanities & the Arts, Social & Behavioral Sciences, or a college-curated list of courses. Over time, the Liberal Education requirement has been revised within the college, successively relaxing restrictions and providing additional choice to students (i.e., removal of a sequencing requirement in 1999; addition of the college-curated course list in 2010). Simultaneously, the college-curated list of courses continued to expand to include courses from approximately 120 rubrics across campus (including within The Grainger College of Engineering), gradually removing constraints to allow greater flexibility of choice for students to take advantage of the many opportunities the campus has to offer. Still, in its current form, this additional college-level requirement constrains student choice and interferes with their ability to efficiently pursue minors, certificates, and other educational opportunities across campus unless those opportunities intersect with coursework in the Liberal Education requirement.

Simultaneously, the required engineering orientation course, ENG 100, will be granted 1-credit hour. Previously, this course was a 0-credit course. The allocation of 1-credit appropriately recognizes the time and commitment expected of all students who take this course. In the 1-credit version of ENG 100, content will be added to improve teamwork and interpersonal skills, including topics related to diversity, equity, and inclusion (DEI). The engineering accrediting agency, ABET, will soon be adding DEI requirements for accredited programs. This component of ENG 100 is therefore beneficial to all Grainger Engineering programs and students by providing a common framework on which additional DEI topics can build throughout a student's program of study.

After allocating the 6 hours made available by the removal of the Liberal Education requirement to 1 hour of ENG 100 and 4 additional hours of Free Electives within ECE curricula (EE and CE) the remaining one hour is being added to the Technical Electives category in both EE and CE. This change is justified as follows: Earlier in the year 1 hour of Technical Electives was removed from the EE curriculum (see Apr 19, 2021 proposal) to be used for MATH 257 which was being added to both of EE and CE programs as a required core course. This choice, reducing Technical Elective hours instead of Free Elective hours, was made to protect the breadth of the Free Elective option. With most recent addition of 4 new Free Elective hours being requested here, a

concern with reduced Free Elective hours is no longer relevant and thus restoring the count of Technical Electives in the EE program back to 31 is well justified. Also raising the number of Technical Elective hours from 29 to 30 in the CE program is desirable to retain the balance between EE and CE close in terms of the required Technical elective hours.

Finally 4 new technical elective courses were added in Graduation Requirements section --- these are new courses which were recently reviewed and added to the departmentally approved list of technical electives.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

Yes

Required courses

Explain how the inclusion or removal of the courses/subjects listed above impacts the offering departments.

The current Liberal Education requirement is satisfied by a student completing 6 credit hours beyond those required by campus' General Education requirement from Humanities & the Arts, Social & Behavioral Sciences, or a college-curated list of courses (containing courses from over 120 rubrics across campus). An analysis of student course selection in the Liberal Education category indicates 25% of courses are taken in the College of Liberal Arts & Sciences, 20% from the College of Applied Health Sciences, 18% from Gies College of Business, 11% from the College of Agricultural, Consumer and Environmental Sciences, 11% from the College of Fine and Applied Arts, and 9% from The Grainger College of Engineering. Less than 2% of credits are taken in each of the remaining colleges and units across campus.

Although it might stand to reason that removal of the Liberal Education requirement would reduce the amount of credits Grainger Engineering students take outside of their home college, the data do not support that assertion. Specifically, despite the current Liberal Education requirement being set at 6 credit hours, the average number of credit hours completed from the Liberal Education course list upon graduation is 11.9. Through discussions with departmental and college advisors as well as students, students are making course selections not because the course satisfies the Liberal Education requirement, but because they are interested in the coursework offered

outside of their home college, are pursing minors and other educational opportunities, and are looking to balance course loads between technical and non- technical courses. Taken together, the data and evidence from advisors and students suggest that students will continue to take the types of courses represented on the Liberal Education course list, even if not specifically required to do so.

Attach letters of support or acknowledgement from other departments.	Letters of Acknowledgement - Liberal Education Electives.pdf

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

CE BS program is ABET Accredited.

The Program Educational Objectives of the CE program presented to ABET is as follows:

The University of Illinois Computer Engineering program will produce graduates having the choice, talents, and knowledge to:

1. Pursue a diverse range of careers as engineers, consultants, and entrepreneurs.
2. Continue their education in leading graduate programs in engineering and interdisciplinary areas to emerge as researchers, experts, and educators. 3. Learn and create new knowledge in ever-changing environments of the 21st century, and communicate their work and ideas to colleagues and the public at large.
4. Practice and inspire high ethical and technical standards, and lead their professional disciplines, organizations, and communities globally.

All four of these objectives require a student to possess all seven of the skills listed as Student Outcomes of our program (see below). The particular career paths listed in the first two objectives are engineers, consultants, entrepreneurs --- reachable directly after the B.S. degree --- as well as researchers, experts, and educators, typically for those graduates who choose to continue their education in some graduate program.

Each of these six career choices will critically depend on students acquiring all seven of the particular skills enumerated as Student Outcomes, namely:

1. (Principles) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. (Design) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. (Communication) an ability to communicate effectively with a range of audiences.
4. (Professionalism) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. (Teamwork) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. (Analysis) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. (Learning) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Student's achievement of these objectives and outcomes are monitored and assessed using using a strategy that depends on Self-Assessment reports written by ECE instructors and course directors as well as student and alumni surveys.

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs CompE BS bsn.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text - Overview Tab

Text for Overview tab on the Catalog Page. This is not official content, it is used to help build the new catalog page for the program. Can be edited in the catalog by the college or department.

Computer Engineering at The Grainger College of Engineering focuses on the development of vital computing technologies, ranging from chips to computers to networks to programming tools to key algorithms for building exciting applications. Fundamentally, Computer Engineering addresses the problem of building scalable, trustworthy computing systems, and the faculty's interests span a broad spectrum of issues pertinent to this theme. Computer engineering has taken the lead in revolutionizing many science and engineering disciplines with parallel computing, from chips to clouds to planet-scale critical infrastructures, and has defined new standards of security, privacy, and dependability for systems ranging from small circuits to the electric power grids of many nations. Students need a broad and sound set of mathematical and computing skills, and are well-served by a flexible curriculum that enables them to pursue topics of interest among the many subdisciplines in computing.

The computer engineering core curriculum focuses on fundamental computer engineering knowledge: circuits, systems, electromagnetics, computer systems, electronics for information processing and communication, and computer science. The rich set of ECE elective courses permits students to concentrate in any sub-discipline of computer engineering including: hardware systems; cyberphysical systems; foundations and theory; software and languages; algorithms and mathematical tools; trust, reliability, security; networking, mobile and distributed computing; big data analytics and systems; artificial intelligence, robotics, cybernetics.

Statement for Programs of Study Catalog

Graduation Requirements

Minimum Technical GPA: 2.0

TGPA is required for ECE courses (except ECE 316). ~~ECE 316).~~ See **Technical GPA** to clarify requirements.

Minimum Overall GPA: 2.0

Minimum hours required for graduation: 128 hours

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. ~~Specific Advanced Composition courses required for this degree are listedbelow.~~ECE 445 or combination of ECE 496 & ECE 499 satisfies a design elective ~~Orientation~~ and the Campus General Education Advanced Composition requirement.

Orientation ~~Professional DevelopmentFoundational Mathematics~~ and Professional Development

Course List

Code	Title	Hours
ENG 100	Grainger Engineering Orientation Seminar (External transfer students take ENG 300 instead.)	1
Total Hours		1

Foundational Mathematics and Science

Course List

Code	Title	Hours
MATH 221	Calculus I (MATH 220 may be substituted. MATH 220 is appropriate for students with no background in calculus. 4 of 5 credit hours count towards degree.)	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications	3
or MATH 416	Abstract Linear Algebra	
MATH 285	Intro Differential Equations	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
PHYS 213	Univ Physics: Thermal Physics	2
PHYS 214	Univ Physics: Quantum Physics	2
Total Hours		29

Computer Engineering Technical Core

Course List

Code	Title	Hours
ECE 110	Introduction to Electronics	3
ECE 120	Introduction to Computing	4
ECE 210	Analog Signal Processing	4
ECE 220	Computer Systems & Programming	4
CS 173	Discrete Structures (MATH 213 may be substituted.)	3
CS 225	Data Structures	4
ECE 313	Probability with Engrg Applic (STAT 410 may be substituted.)	3
ECE 374	Introduction to Algorithms & Models of Computation	4
ECE 385	Digital Systems Laboratory	3

Code	Title	Hours
ECE 391	Computer Systems Engineering	4
Total Hours		36

Technical Electives

Course List

Code	Title	Hours
From the Departmentally Approved List of Technical Electives to include: at least 1 Electrical Engineering Foundations course, at least 3 Advanced Computing Electives, at least 1 Design Elective		30
AE 202	Aerospace Flight Mechanics	3
AE 302	Aerospace Flight Mechanics II	3
AE 311	Incompressible Flow	3
AE 312	Compressible Flow	3
AE 321	Mechs of Aerospace Structures	3
AE 352	Aerospace Dynamical Systems	3
AE 353	Aerospace Control Systems	3
AE 402	Orbital Mechanics	3 or 4
AE 403	Spacecraft Attitude Control	3 or 4
AE 410	Computational Aerodynamics	3 or 4
AE 412	Viscous Flow & Heat Transfer	4
AE 416	Applied Aerodynamics	3 or 4
AE 419	Aircraft Flight Mechanics	3 or 4
AE 420	Finite Element Analysis	3 or 4
AE 428	Mechanics of Composites	3
AE 433	Aerospace Propulsion	3 or 4
AE 434	Rocket Propulsion	3 or 4
AE 435	Electric Propulsion	3 or 4
AE 451	Aeroelasticity	3 or 4
AE 460	Aerodynamics & Propulsion Lab	2
Agri. Bio Eng. (ABE): all 300 and 400 level courses except 440. Exceptions for seminars and special topics will be reviewed in Advising Office.		
ASTR 210	Introduction to Astrophysics	3
ASTR 310	Computing in Astronomy	3
ASTR 330	Extraterrestrial Life	3
ASTR 350	The Big Bang, Black Holes, and the End of the Universe	3
ASTR 404	Stellar Astrophysics	3
ASTR 405	Planetary Systems	3
ASTR 406	Galaxies and the Universe	3
ASTR 414	Astronomical Techniques	4

Code	Title	Hours
ASTR 450	Astrochemistry	4
ATMS 201	General Physical Meteorology	3
ATMS 301	Atmospheric Thermodynamics	3
ATMS 302	Atmospheric Dynamics I	3
ATMS 303	Synoptic-Dynamic Wea Analysis	4
ATMS 304	Radiative Transfer-Remote Sens	3
ATMS 305	Computing and Data Analysis	3
ATMS 404	Risk Analysis in Earth Science	3 or 4
ATMS 405	Boundary Layer Processes	4
ATMS 406	Tropical Meteorology	4
ATMS 410	Radar Remote Sensing	4
ATMS 411	Satellite Remote Sensing	4
ATMS 420	Atmospheric Chemistry	4
ATMS 421	Earth Systems Modeling	4
ATMS 447	Climate Change Assessment	3
ATMS 449	Biogeochemical Cycles	4
BIOC 406	Gene Expression & Regulation	3
BIOC 440	Physical Chemistry Principles	4
BIOC 446	Physical Biochemistry	3
BIOC 455	Technqs Biochem & Biotech	4
BIOE 201	Conservation Principles Bioeng	3
BIOE 202	Cell & Tissue Engineering Lab	2
BIOE 302	Modeling Human Physiology	3
BIOE 414	Biomedical Instrumentation	3
BIOE 415	Biomedical Instrumentation Lab	2
BIOE 461	Cellular Biomechanics	4
BIOE 467	Biophotonics	3
BIOE 476	Tissue Engineering	3
BIOE 480	Magnetic Resonance Imaging	3 or 4
BIOE 485	Computational Mathematics for Machine Learning and Imaging	4
Biophysics (BIOP): All 400 level courses except seminars and special topics, which may be reviewed in the Advising Office		
CHBE 221	Principles of CHE	3
CHBE 321	Thermodynamics	4
CHBE 421	Momentum and Heat Transfer	4
CHBE 422	Mass Transfer Operations	4
CHBE 424	Chemical Reaction Engineering	3
CHBE 430	Unit Operations Laboratory	4
CHBE 431	Process Design	4
CHBE 440	Process Control and Dynamics	3
CHBE 451	Transport Phenomena	3
CHBE 452	Chemical Kinetics & Catalysis	3
CHBE 453	Electrochemical Engineering	2 or 3
CHBE 456	Polymer Science & Engineering	3

Code	Title	Hours
CHBE 457	Microelectronics Processing	3
CHBE 471	Biochemical Engineering	3 or 4
CHBE 472	Techniques in Biomolecular Eng	3 or 4
CHBE 473	Biomolecular Engineering	3 or 4
CHBE 474	Metabolic Engineering	3 or 4
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
Chemistry (CHEM): All 200, 300 and 400 level courses except 397, 497, 499, and seminars and special topics, which may be reviewed in the Advising Office		
CEE 310	Transportation Engineering	3
CEE 330	Environmental Engineering	3
CEE 408	Railroad Transportation Engrg	3 or 4
CEE 410	Railway Signaling & Control	3 or 4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 430	Ecological Quality Engineering	2
CEE 447	Atmospheric Chemistry	4
CEE 491	Decision and Risk Analysis	3 or 4
CPSC 265	Genetic Engineering Lab	3
CS 101	Intro Computing: Engrg & Sci (By Approval)	3
CS 242	Programming Studio	3
CS 357	Numerical Methods I	3
CS 410	Text Information Systems	3 or 4
CS 411	Database Systems	3 or 4
CS 412	Introduction to Data Mining	3 or 4
CS 413	Intro to Combinatorics	3 or 4
CS 414	Multimedia Systems	3 or 4
CS 416	Data Visualization	3 or 4
CS 418	Interactive Computer Graphics	3 or 4
CS 419	Production Computer Graphics	3 or 4

Code	Title	Hours
CS 420	Parallel Progrmg: Sci & Engrg	3 or 4
CS 421	Programming Languages & Compilers	3 or 4
CS 422	Programming Language Design	3 or 4
CS 423	Operating Systems Design	3 or 4
CS 424	Real-Time Systems	3 or 4
CS 425	Distributed Systems	3 or 4
CS 426	Compiler Construction	3 or 4
CS 427	Software Engineering I	3 or 4
CS 428	Software Engineering II	3 or 4
CS 429	Software Engineering II, ACP	3
CS 431	Embedded Systems	3 or 4
CS 433	Computer System Organization	3 or 4
CS 435	Cloud Networking	3 or 4
CS 436	Computer Networking Laboratory	3 or 4
CS 438	Communication Networks	3 or 4
CS 439	Wireless Networks	3 or 4
CS 440	Artificial Intelligence	3 or 4
CS 445	Computational Photography	3 or 4
CS 446	Machine Learning	3 or 4
CS 447	Natural Language Processing	3 or 4
CS 450	Numerical Analysis	3 or 4
CS 460	Security Laboratory	3 or 4
CS 461	Computer Security I	4
CS 463	Computer Security II	3 or 4
CS 465	User Interface Design	4

Code	Title	Hours
CS 466	Introduction to Bioinformatics	3 or 4
CS 467	Social Visualization	3 or 4
CS 473	Algorithms	4
CS 475	Formal Models of Computation	3 or 4
CS 476	Program Verification	3 or 4
CS 477	Formal Software Development Methods	3 or 4
CS 481	Advanced Topics in Stochastic Processes & Applications	3 or 4
CS 484	Parallel Programming	3 or 4
CS 398	Special Topics (As approved)	1 to 4
CS 498	Special Topics (As approved)	1 to 4
ECE 297	Individual Study	1
ECE 304	Photonic Devices	3
ECE 307	Techniques for Engrg Decisions	3
ECE 310	Digital Signal Processing	3
ECE 311	Digital Signal Processing Lab	1
ECE 314	Probability in Engineering Lab	1
ECE 329	Fields and Waves I	3
ECE 330	Power Ckts & Electromechanics	3
ECE 333	Green Electric Energy	3
ECE 340	Semiconductor Electronics	3
ECE 342	Electronic Circuits	3
ECE 343	Electronic Circuits Laboratory	1
ECE 350	Fields and Waves II	3
ECE 365	Data Science and Engineering	3
ECE 380	Biomedical Imaging	3
ECE 395	Advanced Digital Projects Lab	2 or 3
ECE 396	Honors Project	1 to 4
ECE 397	Individual Study in ECE	0 to 4
ECE 402	Electronic Music Synthesis	3
ECE 403	Audio Engineering	3
ECE 407	Cryptography	3 or 4
ECE 408	Applied Parallel Programming	4
ECE 411	Computer Organization & Design	4
ECE 412	Microcomputer Laboratory	3

Code	Title	Hours
ECE 414	Biomedical Instrumentation	3
ECE 415	Biomedical Instrumentation Lab	2
ECE 416	Biosensors	3
ECE 417	Multimedia Signal Processing	4
ECE 418	Image & Video Processing	4
ECE 419	Security Laboratory	3 or 4
ECE 420	Embedded DSP Laboratory	2
ECE 422	Computer Security I	4
ECE 424	Computer Security II	3 or 4
ECE 425	Intro to VLSI System Design	3
ECE 428	Distributed Systems	3 or 4
ECE 431	Electric Machinery	4
ECE 432	Advanced Electric Machinery	3
ECE 435	Computer Networking Laboratory	3 or 4
ECE 437	Sensors and Instrumentation	3
ECE 438	Communication Networks	3 or 4
ECE 439	Wireless Networks	3 or 4
ECE 441	Physcs & Modeling Semicond Dev	3
ECE 442	Silicon Photonics	3 or 4
ECE 443	LEDs and Solar Cells	4
ECE 444	IC Device Theory & Fabrication	4
ECE 445	Senior Design Project Lab	4
ECE 446	Principles of Experimental Research in Electrical Engineering	4
ECE 447	Active Microwave Ckt Design	3
ECE 448	Artificial Intelligence	3 or 4
ECE 451	Adv Microwave Measurements	3
ECE 452	Electromagnetic Fields	3
ECE 453	Wireless Communication Systems	4
ECE 454	Antennas	3
ECE 455	Optical Electronics	3 or 4
ECE 456	Global Nav Satellite Systems	4
ECE 457	Microwave Devices & Circuits	3
ECE 458	Applic of Radio Wave Propag	3
ECE 459	Communications Systems	3
ECE 460	Optical Imaging	4
ECE 461	Digital Communications	3
ECE 462	Logic Synthesis	3
ECE 463	Digital Communications Lab	2

Code	Title	Hours
ECE 464	Power Electronics	3
ECE 465	Optical Communications Systems	3
ECE 466	Optical Communications Lab	1
ECE 467	Biophotonics	3
ECE 468	Optical Remote Sensing	3
ECE 469	Power Electronics Laboratory	2
ECE 470	Introduction to Robotics	4
ECE 472	Biomedical Ultrasound Imaging	3
ECE 473	Fund of Engrg Acoustics	3 or 4
ECE 476	Power System Analysis	3
ECE 478	Formal Software Development Methods	3 or 4
ECE 480	Magnetic Resonance Imaging	3 or 4
ECE 481	Nanotechnology	4
ECE 482	Digital IC Design	3
ECE 483	Analog IC Design	3
ECE 485	MEMS Devices & Systems	3
ECE 486	Control Systems	4
ECE 487	Intro Quantum Electr for EEs	3
ECE 488	Compound Semicond & Devices	3
ECE 489	Robot Dynamics and Control	4
ECE 490	Introduction to Optimization	3 or 4
ECE 491	Numerical Analysis	3 or 4
ECE 492	Parallel Progrmg: Sci & Engrg	3 or 4
ECE 493	Advanced Engineering Math	3 or 4
ECE 495	Photonic Device Laboratory	3
ECE 496	Senior Research Project	2
ECE 499	Senior Thesis	2
ECE 298	Special Topics (As approved)	1 to 4
ECE 398	Special Topics in ECE (As approved)	0 to 4
ECE 498	Special Topics in ECE (As approved)	0 to 4
ENG 491	Interdisciplinary Design Proj (CubeSat, Solar Decathlon, Formula SAE, Baja SAE or by approval)	1 to 4
GEOL 107	Physical Geology	4
GEOL 208	History of the Earth System	4
GEOL 333	Earth Materials and the Env	4
GEOL 380	Environmental Geology	4
GEOL 411	Structural Geol and Tectonics	4

Code	Title	Hours
GEOL 417	Geol Field Methods, Western US	6
GEOL 432	Mineralogy and Mineral Optics	4
GEOL 436	Petrology and Petrography	4
GEOL 440	Sedimentology and Stratigraphy	4
GEOL 450	Investigating the Earth’s Interior	3
GEOL 452	Introduction to Geophysics	4
GEOL 460	Geochemistry	3
IE 310	Deterministic Models in Optimization	3
IE 330	Industrial Quality Control	3
IE 360	Facilities Planning and Design	3
IE 361	Production Planning & Control	3
IE 400	Design & Anlys of Experiments	3 or 4
IE 410	Advanced Topics in Stochastic Processes & Applications	3 or 4
IE 411	Optimization of Large Systems	3 or 4
IE 412	OR Models for Mfg Systems	3 or 4
IE 413	Simulation	3 or 4
IE 420	Financial Engineering	3 or 4
IE 430	Economic Found of Quality Syst	3 or 4
IE 431	Design for Six Sigma	3
IB 150	Organismal & Evolutionary Biol	4
IB 202	Physiology	3 or 4
IB 203	Ecology	4
IB 204	Genetics	3 or 4
IB 302	Evolution	4
IB 335	Plant Systematics	4
IB 348	Fish and Wildlife Ecology	3
IB 368	Vertebrate Natural History	4
IB 401	Introduction to Entomology	3 or 4
IB 405	Evolution of Traits and Genomes	3
IB 420	Plant Physiology	3
IB 421	Photosynthesis	3
IB 426	Env and Evol Physl of Animals	3
IB 427	Insect Physiology	4
IB 431	Behavioral Ecology	3
IB 432	Genes and Behavior	3
IB 440	Plants and Global Change	3
IB 443	Evolutionary Ecology	3

Code	Title	Hours
IB 444	Insect Ecology	3 or 4
IB 451	Conservation Biology	4
IB 452	Ecosystem Ecology	3
IB 453	Community Ecology	3
IB 461	Ornithology	4
IB 462	Mammalogy	4
IB 463	Ichthyology	4
IB 464	Herpetology	4
IB 467	Principles of Systematics	4
IB 468	Insect Classification and Evol	4
IB 471	General Mycology	4
IB 472	Plant Molecular Biology	1
IB 473	Plant Genomics	1
IB 481	Vector-borne Diseases	4
IB 482	Insect Pest Management	3
IB 483	Insect Pathology	3
IB 485	Environ Toxicology & Health	3
IB 486	Pesticide Toxicology	3 or 4
LING 300	Anat & Physiol Spch Mechanism	4
LING 406	Introduction to Computational Linguistics	3 or 4
LING 407	Logic and Linguistic Analysis	3 or 4
LING 427	Language and the Brain	3 or 4
MSE 280	Engineering Materials	3
Material Science and Engineering (MSE): All 300 and 400 level courses except 304, 460, 461, and seminars/special topics, which may be reviewed by the Advising Office		
MATH 347	Fundamental Mathematics	3
MATH 348	Fundamental Mathematics-ACP	4
MATH 357	Numerical Methods I	3
MATH 402	Non Euclidean Geometry	3 or 4
MATH 403	Euclidean Geometry	3 or 4
MATH 412	Graph Theory	3 or 4
MATH 413	Intro to Combinatorics	3 or 4
MATH 414	Mathematical Logic	3 or 4
MATH 417	Intro to Abstract Algebra	3 or 4
MATH 418	Intro to Abstract Algebra II	3 or 4

Code	Title	Hours
MATH 423	Differential Geometry	3 or 4
MATH 424	Honors Real Analysis	3
MATH 425	Honors Advanced Analysis	3
MATH 427	Honors Abstract Algebra	3
MATH 428	Honors Topics in Mathematics	3
MATH 432	Set Theory and Topology	3 or 4
MATH 442	Intro Partial Diff Equations	3 or 4
MATH 444	Elementary Real Analysis	3 or 4
MATH 446	Applied Complex Variables	3 or 4
MATH 447	Real Variables	3 or 4
MATH 448	Complex Variables	3 or 4
MATH 450	Numerical Analysis	3 or 4
MATH 453	Number Theory	3 or 4
MATH 473	Algorithms	4
MATH 475	Formal Models of Computation	3 or 4
MATH 481	Vector and Tensor Analysis	3 or 4
MATH 482	Linear Programming	3 or 4
MATH 484	Nonlinear Programming	3 or 4
MATH 487	Advanced Engineering Math	3 or 4
MATH 489	Dynamics & Differential Eqns	3 or 4
MCB 150	Molec & Cellular Basis of Life	4
MCB 250	Molecular Genetics	3
MCB 251	Exp Techniqs in Molecular Biol	2
MCB 252	Cells, Tissues & Development	3
MCB 253	Exp Techniqs in Cellular Biol	2
MCB 300	Microbiology	3
MCB 301	Experimental Microbiology	3
MCB 314	Introduction to Neurobiology	3
MCB 316	Genetics and Disease	4
MCB 354	Biochem & Phys Basis of Life	3
MCB 400	Cancer Cell Biology	3
MCB 401	Cellular Physiology	3

Code	Title	Hours
MCB 402	Sys & Integrative Physiology	3
MCB 403	Cell & Membrane Physiology Lab	1 or 2
MCB 404	Sys & Integrative Physiol Lab	1 to 2
MCB 406	Gene Expression & Regulation	3
MCB 408	Immunology	3
MCB 410	Developmental Biology, Stem Cells and Regenerative Medicine	3
MCB 413	Endocrinology	3
MCB 419	Brain, Behavior & Info Process	3
MCB 421	Microbial Genetics	3
MCB 424	Microbial Biochemistry	3
MCB 426	Bacterial Pathogenesis	3
MCB 430	Molecular Microbiology	3
MCB 431	Microbial Physiology	3
MCB 433	Virology & Viral Pathogenesis	3
MCB 435	Evolution of Infectious Disease	3
MCB 446	Physical Biochemistry	3
MCB 480	Eukaryotic Cell Signaling	3
ME 200	Thermodynamics	3
ME 310	Fundamentals of Fluid Dynamics	4
ME 320	Heat Transfer	4
ME 330	Engineering Materials	4
ME 340	Dynamics of Mechanical Systems	3.5
ME 370	Mechanical Design I	3
ME 371	Mechanical Design II	3
ME 400	Energy Conversion Systems	3 or 4
ME 401	Refrigeration and Cryogenics	3 or 4
ME 402	Design of Thermal Systems	3 or 4
ME 403	Internal Combustion Engines	3 or 4
ME 404	Intermediate Thermodynamics	4
ME 410	Intermediate Gas Dynamics	3 or 4
ME 411	Viscous Flow & Heat Transfer	4
ME 412	Numerical Thermo-Fluid Mechs	2 to 4
ME 420	Intermediate Heat Transfer	4
ME 430	Failure of Engrg Materials	3 or 4
ME 431	Mechanical Component Failure	3 or 4
ME 440	Kinem & Dynamics of Mech Syst	3 or 4

Code	Title	Hours
ME 445	Introduction to Robotics	4
ME 451	Computer-Aided Mfg Systems	3 or 4
ME 452	Num Control of Mfg Processes	3 or 4
ME 460	Industrial Control Systems	4
ME 461	Computer Cntrl of Mech Systems	3 or 4
ME 471	Finite Element Analysis	3 or 4
ME 472	Introduction to Tribology	3 or 4
ME 485	MEMS Devices & Systems	3
ME 487	MEMS-NEMS Theory & Fabrication	4
MUS 407	Elect Music Techniques I	3
MUS 409	Elec Music Techniques II	2
NEUR 453	Cog Neuroscience of Vision	3 or 4
NPRE 201	Energy Systems	2 or 3
NPRE 247	Modeling Nuclear Energy System	3
NPRE 330	Materials in Nuclear Engineering	3
NPRE 402	Nuclear Power Engineering	3 or 4
NPRE 412	Nuclear Power Econ & Fuel Mgmt	3 or 4
NPRE 421	Plasma and Fusion Science	3
NPRE 423	Plasma Laboratory	2
NPRE 429	Plasma Engineering	3
~~NPRE 431~~	~~Course NPRE 431 Not Found~~	
NPRE 432	Nuclear Engrg Materials Lab	2
NPRE 435	Radiological Imaging	3
NPRE 441	Radiation Protection	4
NPRE 442	Radioactive Waste Management	3
NPRE 444	Nuclear Analytical Methods Lab	2 or 3
NPRE 446	Radiation Interact w/Matter I	3
NPRE 447	Radiation Interact w/Matter II	3
NPRE 448	Nuclear Syst Engrg & Design	4
NPRE 451	NPRE Laboratory	3
NPRE 455	Neutron Diffusion & Transport	4
NPRE 457	Safety Anlys Nucl Reactor Syst	3 or 4
NPRE 458	Design in NPRE	4
NPRE 470	Fuel Cells & Hydrogen Sources	3
NPRE 475	Wind Power Systems	3 or 4

Code	Title	Hours
PHYS 225	Relativity & Math Applications	2
PHYS 325	Classical Mechanics I	3
PHYS 326	Classical Mechanics II	3
PHYS 401	Classical Physics Lab	3
PHYS 402	Light	3 or 4
PHYS 403	Modern Experimental Physics	4 or 5
PHYS 406	Acoustical Physics of Music	4
PHYS 419	Space, Time, and Matter-ACP	3 or 4
PHYS 420	Space, Time, and Matter	2
PHYS 427	Thermal & Statistical Physics	4
PHYS 460	Condensed Matter Physics	4
PHYS 466	Atomic Scale Simulations	3 or 4
PHYS 470	Subatomic Physics	4
PHYS 485	Atomic Phys & Quantum Theory	3
PHYS 486	Quantum Physics I	4
PHYS 487	Quantum Physics II	4
PSYC 204	Intro to Brain and Cognition	3
SHS 200	General Phonetics	3
SHS 240	Intro Sound & Hearing Science	3
SHS 300	Anat & Physiol Spch Mechanism	4
SHS 301	General Speech Science	4
SHS 320	Development of Spoken Language	3
SHS 450	Intro Audiol & Hear Disorders	4
SHS 470	Neural Bases Spch Lang	4
STAT 420	Methods of Applied Statistics	3 or 4
STAT 424	Analysis of Variance	3 or 4
STAT 425	Statistical Modeling I	3 or 4
STAT 428	Statistical Computing	3 or 4
STAT 429	Time Series Analysis	3 or 4
STAT 440	Statistical Data Management	3 or 4
SE 411	Reliability Engineering	3 or 4
SE 420	Digital Control Systems	4
SE 423	Mechatronics	3
SE 424	State Space Design for Control	3
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3

Code	Title	Hours
TAM 251	Introductory Solid Mechanics	3
TAM 324	Behavior of Materials	4
TAM 335	Introductory Fluid Mechanics	4
TAM 412	Intermediate Dynamics	4
TAM 435	Intermediate Fluid Mechanics	4
TAM 445	Continuum Mechanics	4
TAM 451	Intermediate Solid Mechanics	4
Select one course from the following list of Electrical Engineering Foundations Courses:		
ECE 310	Digital Signal Processing	3
ECE 330	Power Ckts & Electromechanics	3
ECE 329	Fields and Waves I	3
ECE 340	Semiconductor Electronics	3
ECE 461	Digital Communications	3
ECE 486	Control Systems	4
Select three courses from the following list of Advanced Computing Electives:		
CS 357	Numerical Methods I	3
CS 411	Database Systems	3 or 4
CS 412	Introduction to Data Mining	3 or 4
CS 414	Multimedia Systems	3 or 4
CS 418	Interactive Computer Graphics	3 or 4
CS 419	Production Computer Graphics	3 or 4
CS 420	Parallel Progrmg: Sci & Engrg	3 or 4
CS 421	Programming Languages & Compilers	3 or 4
CS 423	Operating Systems Design	3 or 4
CS 424	Real-Time Systems	3 or 4
CS 425	Distributed Systems	3 or 4
CS 426	Compiler Construction	3 or 4
CS 431	Embedded Systems	3 or 4
CS 434	Mobile Computing & Application	3 or 4
CS 436	Computer Networking Laboratory	3 or 4
CS 437	Topics in Internet of Things	3 or 4

Code	Title	Hours
CS 438	Communication Networks	3 or 4
CS 440	Artificial Intelligence	3 or 4
CS 441	Applied Machine Learning	3 or 4
CS 444	Deep Learning for Computer Vision	3 or 4
CS 446	Machine Learning	3 or 4
CS 450	Numerical Analysis	3 or 4
CS 461	Computer Security I	4
CS 475	Formal Models of Computation	3 or 4
CS 476	Program Verification	3 or 4
CS 477	Formal Software Development Methods	3 or 4
CS 483	Applied Parallel Programming	4
ECE 408	Applied Parallel Programming	4
ECE 411	Computer Organization & Design	4
ECE 412	Microcomputer Laboratory	3
ECE 419	Security Laboratory	3 or 4
ECE 422	Computer Security I	4
ECE 424	Computer Security II	3 or 4
ECE 425	Intro to VLSI System Design	3
ECE 428	Distributed Systems	3 or 4
ECE 435	Computer Networking Laboratory	3 or 4
ECE 438	Communication Networks	3 or 4
ECE 439	Wireless Networks	3 or 4
ECE 448	Artificial Intelligence	3 or 4
ECE 462	Logic Synthesis	3
ECE 470	Introduction to Robotics	4
ECE 478	Formal Software Development Methods	3 or 4
ECE 479	IoT and Cognitive Computing	4
ECE 484	Principles of Safe Autonomy	4
ECE 491	Numerical Analysis	3 or 4

Code	Title	Hours
ECE 492	Parallel Progrmg: Sci & Engrg	3 or 4
Select one course from departmentally approved Design Elective list below:		
ECE 411	Computer Organization & Design	4
ECE 445	Senior Design Project Lab	4
ECE 496 & ECE 499	Senior Research Project and Senior Thesis	4
Free Electives		

Course List

Code	Title	Hours
~~The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts 7~~		~~6~~
~~Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree. 8~~		~~12~~
Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree.		16
Total Hours of Curriculum to Graduate		128

~~Footnotes~~

~~**12**~~

~~MATH 220%7C *may be substituted, with four of the five credit hours applying toward the degree.* MATH 220%7C *is appropriate for students with no background in calculus.*~~

~~**3**~~

~~*Freshmen take ECE 110%7C for 3 credit hours. Lab-only version taken by transfer students (with special permission) is 1 credit hour.*~~

~~**4**MATH 213%7C *may be substituted.***5**STAT 410%7C *may be substituted.***6**~~

~~*Advanced Composition may be satisfied by completing ECE 445%7C or ECE 496%7C and ECE 499%7C or a course within either the general education or free elective categories which has the Advanced Composition designation.*~~

~~**7**~~

~~*The Grainger College of Engineering approved liberal education course list. Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.*~~

~~**8***The Grainger College of Engineering restrictions to free electives.*~~

Corresponding Degree	BS Bachelor of Science

Program Features

Academic Level	Undergraduate
Does this major have transcripted concentrations?	No

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

128 hours

CIP Code 140901 - Computer Engineering, General.

Is This a Teacher Certification Program?
No

Will specialized accreditation be sought for this program?

No

Delivery Method

This program is available:
On Campus - Students are required to be on campus, they may take some online courses.

Admission Requirements

Desired Effective Admissions Term

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

Describe how critical academic functions such as admissions and student advising are managed.

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

These changes will not impact enrollment.

Estimated Annual Number of Degrees Awarded

Year One Estimate	5th Year Estimate (or when fully implemented)

What is the matriculation term for this program?
Fall

Budget

Are there budgetary No

implications for this revision?

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Additional Budget Information

Attach File(s)

Financial Resources

How does the unit intend to financially support this proposal?

Will the unit need to seek campus or other external resources?

No

Attach letters of support

What tuition rate do you expect to charge for this program? e.g, Undergraduate Base Tuition, or Engineering Differential, or Social Work Online (no dollar amounts necessary)

Are you seeking a change in the tuition rate or differential for this program?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/acknowledgement from faculty, students, and/or other impacted units as appropriate.

Attach File(s)

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

These changes will not impact our faculty resources.

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

There is no impact to the use of the Library collections, resources, and services.

EP Documentation

EP Control Number	EP.22.087
Attach Rollback/Approval Notices	ep22087_response from sponsor_20220214.pdf
This proposal requires HLC inquiry	No

DMI Documentation

Attach Final Approval Notices	
Banner/Codebook Name	BS:Computer Engineering -UIUC
Program Code:	10KP0109BS

Minor Code	Conc Code	Degree Code		Major Code
0109			BS	

Senate Approval Date	
Senate Conference Approval Date	

BOT Approval Date

IBHE Approval Date

HLC Approval Date

Effective Date:

Attached Document

Justification for this request

Program Reviewer Comments

Key: 248

Addition
Removal
Revision

Current Program of Study

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. Specific Advanced Composition courses required for this degree are listed below.

Orientation and Professional Development		
ENG 100	Engineering Orientation [1]	0
Total Hours		**0**
Foundational Mathematics and Science		
MATH 221	Calculus I [2]	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257 or MATH 416	Linear Algebra with Computational Applications / Abstract Linear Algebra	3
MATH 285	Intro to Differential Eq	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
PHYS 213	Univ Physics: Thermal Physics	2
PHYS 214	Univ Physics: Quantum Physics	2
Total Hours		29
Computer Engineering Technical Core		
ECE 110	Introduction to Electronics [3]	3
ECE 120	Introduction to Computing	4
ECE 210	Analog Signal Processing	4
ECE 220	Computer Systems & Programming	4
CS 173	Discrete Structures [4]	3
CS 225	Data Structures	4
ECE 313	Probability with Engrg Applic [5]	3
ECE 374	Introduction to Algorithms & Models of Computation	4

New Program of Study

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. ECE 445 or combination of ECE 496 & ECE 499 satisfies a design elective and the Campus General Education Advanced Composition requirement.

Development		
ENG 100	Orientation (External transfer students take	1
Total Hours		**1**
Foundational Mathematics and Science		
MATH 221	Calculus I (MATH 220 may be substituted. MATH 220 is appropriate for students with no background in calculus. 4 of 5 credit hours count towards degree.)	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257 or MATH 416	Linear Algebra with Computational Applications / Abstract Linear Algebra	3
MATH 285	Intro to Differential Eq	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
PHYS 213	Univ Physics: Thermal Physics	2
PHYS 214	Univ Physics: Quantum Physics	2
Total Hours		29
Computer Engineering Technical Core		
ECE 110	Introduction to Electronics	3
ECE 120	Introduction to Computing	4
ECE 210	Analog Signal Processing	4
ECE 220	Computer Systems & Programming	4
CS 173	Discrete Structures (MATH 213 may be substituted.)	3
CS 225	Data Structures	4
ECE 313	Probability with Engrg Applic (STAT 410 may be substituted.)	3
ECE 374	Introduction to Algorithms & Models of Computation	4

ECE 385	Digital Systems Laboratory	3
ECE 391	Computer Systems Engineering	4
Total Hours		36

Technical Electives		
From the Departmentally Approved List of Technical Electives, to at least 1 Electrical Engineering Foundations course at least 3 Advanced Computing electives at least 1 Design Elective		29
AE 202	Aerospace Flight Mechanics	3
AE 302	Aerospace Flight Mechanics II	3
AE 311	Incompressible Flow	3
AE 312	Compressible Flow	3
AE 321	Mechs of Aerospace Structures	3
AE 352	Aerospace Dynamical Systems	3
AE 353	Aerospace Control Systems	3
AE 402	Orbital Mechanics	3 or 4
AE 403	Spacecraft Attitude Control	3 or 4
AE 410	Computational Aerodynamics	3 or 4
AE 412	Viscous Flow & Heat Transfer	4
AE 416	Applied Aerodynamics	3 or 4
AE 419	Aircraft Flight Mechanics	3 or 4
AE 420	Finite Element Analysis	3 or 4
AE 428	Mechanics of Composites	3
AE 433	Aerospace Propulsion	3 or 4
AE 434	Rocket Propulsion	3 or 4
AE 435	Electric Propulsion	3 or 4
AE 451	Aeroelasticity	3 or 4
AE 460	Aerodynamics & Propulsion Lab	2
Agri. Bio Eng. (ABE): all 300 and 400 level courses except 440.		
ASTR 210	Introduction to Astrophysics	3
ASTR 310	Computing in Astronomy	3
ASTR 330	Extraterrestrial Life	3
ASTR 350	The Big Bang, Black Holes, and the End of the Universe	3
ASTR 404	Stellar Astrophysics	3
ASTR 405	Planetary Systems	3
ASTR 406	Galaxies and the Universe	3
ASTR 414	Astronomical Techniques	4
ASTR 450	Astrochemistry	4
ATMS 201	General Physical Meteorology	3
ATMS 301	Atmospheric Thermodynamics	3
ATMS 302	Atmospheric Dynamics I	3
ATMS 303	Synoptic-Dynamic Wea Analysis	4
ATMS 304	Radiative Transfer-Remote Sens	3

ECE 385	Digital Systems Laboratory	3
ECE 391	Computer Systems Engineering	4
Total Hours		36

Technical Electives		
From the Departmentally Approved List of Technical Electives, to at least 1 Electrical Engineering Foundations course at least 3 Advanced Computing electives at least 1 Design Elective		30
AE 202	Aerospace Flight Mechanics	3
AE 302	Aerospace Flight Mechanics II	3
AE 311	Incompressible Flow	3
AE 312	Compressible Flow	3
AE 321	Mechs of Aerospace Structures	3
AE 352	Aerospace Dynamical Systems	3
AE 353	Aerospace Control Systems	3
AE 402	Orbital Mechanics	3 or 4
AE 403	Spacecraft Attitude Control	3 or 4
AE 410	Computational Aerodynamics	3 or 4
AE 412	Viscous Flow & Heat Transfer	4
AE 416	Applied Aerodynamics	3 or 4
AE 419	Aircraft Flight Mechanics	3 or 4
AE 420	Finite Element Analysis	3 or 4
AE 428	Mechanics of Composites	3
AE 433	Aerospace Propulsion	3 or 4
AE 434	Rocket Propulsion	3 or 4
AE 435	Electric Propulsion	3 or 4
AE 451	Aeroelasticity	3 or 4
AE 460	Aerodynamics & Propulsion Lab	2
Agri. Bio Eng. (ABE): all 300 and 400 level courses except 440.		
ASTR 210	Introduction to Astrophysics	3
ASTR 310	Computing in Astronomy	3
ASTR 330	Extraterrestrial Life	3
ASTR 350	The Big Bang, Black Holes, and the End of the Universe	3
ASTR 404	Stellar Astrophysics	3
ASTR 405	Planetary Systems	3
ASTR 406	Galaxies and the Universe	3
ASTR 414	Astronomical Techniques	4
ASTR 450	Astrochemistry	4
ATMS 201	General Physical Meteorology	3
ATMS 301	Atmospheric Thermodynamics	3
ATMS 302	Atmospheric Dynamics I	3
ATMS 303	Synoptic-Dynamic Wea Analysis	4
ATMS 304	Radiative Transfer-Remote Sens	3

ATMS 305	Computing and Data Analysis	3	ATMS 305	Computing and Data Analysis	3
ATMS 404	Risk Analysis in Earth Science	3 or 4	ATMS 404	Risk Analysis in Earth Science	3 or 4
ATMS 405	Boundary Layer Processes	4	ATMS 405	Boundary Layer Processes	4
ATMS 406	Tropical Meteorology	4	ATMS 406	Tropical Meteorology	4
ATMS 410	Radar Remote Sensing	4	ATMS 410	Radar Remote Sensing	4
ATMS 411	Satellite Remote Sensing	4	ATMS 411	Satellite Remote Sensing	4
ATMS 420	Atmospheric Chemistry	4	ATMS 420	Atmospheric Chemistry	4
ATMS 421	Earth Systems Modeling	4	ATMS 421	Earth Systems Modeling	4
ATMS 447	Climate Change Assessment	3	ATMS 447	Climate Change Assessment	3
ATMS 449	Biogeochemical Cycles	4	ATMS 449	Biogeochemical Cycles	4
BIOC 406	Gene Expression & Regulation	3	BIOC 406	Gene Expression & Regulation	3
BIOC 440	Physical Chemistry Principles	4	BIOC 440	Physical Chemistry Principles	4
BIOC 446	Physical Biochemistry	3	BIOC 446	Physical Biochemistry	3
BIOC 455	Technqs Biochem & Biotech	4	BIOC 455	Technqs Biochem & Biotech	4
BIOE 201	Conservation Principles Bioeng	3	BIOE 201	Conservation Principles Bioeng	3
BIOE 202	Cell & Tissue Engineering Lab	2	BIOE 202	Cell & Tissue Engineering Lab	2
BIOE 302	Modeling Human Physiology	3	BIOE 302	Modeling Human Physiology	3
BIOE 414	Biomedical Instrumentation	3	BIOE 414	Biomedical Instrumentation	3
BIOE 415	Biomedical Instrumentation Lab	2	BIOE 415	Biomedical Instrumentation Lab	2
BIOE 461	Cellular Biomechanics	4	BIOE 461	Cellular Biomechanics	4
BIOE 467	Biophotonics	3	BIOE 467	Biophotonics	3
BIOE 476	Tissue Engineering	3	BIOE 476	Tissue Engineering	3
BIOE 480	Magnetic Resonance Imaging	3 or 4	BIOE 480	Magnetic Resonance Imaging	3 or 4
BIOE 485	Computational Mathematics for Machine Learning and Imaging	4	BIOE 485	Computational Mathematics for Machine Learning and Imaging	4
Biophysics (BIOP): All 400 level courses except seminars and special			Biophysics (BIOP): All 400 level courses except seminars and		
CHBE 221	Principles of CHE	3	CHBE 221	Principles of CHE	3
CHBE 321	Thermodynamics	4	CHBE 321	Thermodynamics	4
CHBE 421	Momentum and Heat Transfer	4	CHBE 421	Momentum and Heat Transfer	4
CHBE 422	Mass Transfer Operations	4	CHBE 422	Mass Transfer Operations	4
CHBE 424	Chemical Reaction Engineering	3	CHBE 424	Chemical Reaction Engineering	3
CHBE 430	Unit Operations Laboratory	4	CHBE 430	Unit Operations Laboratory	4
CHBE 431	Process Design	4	CHBE 431	Process Design	4
CHBE 440	Process Control and Dynamics	3	CHBE 440	Process Control and Dynamics	3
CHBE 451	Transport Phenomena	3	CHBE 451	Transport Phenomena	3
CHBE 452	Chemical Kinetics & Catalysis	3	CHBE 452	Chemical Kinetics & Catalysis	3
CHBE 453	Electrochemical Engineering	2 or 3	CHBE 453	Electrochemical Engineering	2 or 3
CHBE 456	Polymer Science & Engineering	3	CHBE 456	Polymer Science & Engineering	3
CHBE 457	Microelectronics Processing	3	CHBE 457	Microelectronics Processing	3

CHBE 471	Biochemical Engineering	3 or 4	CHBE 471	Biochemical Engineering	3 or 4
CHBE 472	Techniques in Biomolecular Eng	3 or 4	CHBE 472	Techniques in Biomolecular Eng	3 or 4
CHBE 473	Biomolecular Engineering	3 or 4	CHBE 473	Biomolecular Engineering	3 or 4
CHBE 474	Metabolic Engineering	3 or 4	CHBE 474	Metabolic Engineering	3 or 4
CHEM 102	General Chemistry I	3	CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1	CHEM 103	General Chemistry Lab I	1
CHEM 104	General Chemistry II	3	CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1	CHEM 105	General Chemistry Lab II	1
Chemistry (CHEM): All 200, 300 and 400 level courses except 397, 497,			Chemistry (CHEM): All 200, 300 and 400 level courses except		
CEE 310	Transportation Engineering	3	CEE 310	Transportation Engineering	3
CEE 330	Environmental Engineering	3	CEE 330	Environmental Engineering	3
CEE 408	Railroad Transportation Engrg	3 or 4	CEE 408	Railroad Transportation Engrg	3 or 4
CEE 410	Railway Signaling & Control	3 or 4	CEE 410	Railway Signaling & Control	3 or 4
CEE 416	Traffic Capacity Analysis	3 or 4	CEE 416	Traffic Capacity Analysis	3 or 4
CEE 430	Ecological Quality Engineering	2	CEE 430	Ecological Quality Engineering	2
CEE 447	Atmospheric Chemistry	4	CEE 447	Atmospheric Chemistry	4
CEE 491	Decision and Risk Analysis	3 or 4	CEE 491	Decision and Risk Analysis	3 or 4
CPSC 265	Genetic Engineering Lab	3	CPSC 265	Genetic Engineering Lab	3
CS 101	Intro Computing: Engrg & Sci (By Approval)	3	CS 101	Intro Computing: Engrg & Sci (By Approval)	3
CS 242	Programming Studio	3	CS 242	Programming Studio	3
CS 357	Numerical Methods I	3	CS 357	Numerical Methods I	3
CS 410	Text Information Systems	3 or 4	CS 410	Text Information Systems	3 or 4
CS 411	Database Systems	3 or 4	CS 411	Database Systems	3 or 4
CS 412	Introduction to Data Mining	3 or 4	CS 412	Introduction to Data Mining	3 or 4
CS 413	Intro to Combinatorics	3 or 4	CS 413	Intro to Combinatorics	3 or 4
CS 414	Multimedia Systems	3 or 4	CS 414	Multimedia Systems	3 or 4
CS 416	Data Visualization	3 or 4	CS 416	Data Visualization	3 or 4
CS 418	Interactive Computer Graphics	3 or 4	CS 418	Interactive Computer Graphics	3 or 4
CS 419	Production Computer Graphics	3 or 4	CS 419	Production Computer Graphics	3 or 4
CS 420	Parallel Progrmg: Sci & Engrg	3 or 4	CS 420	Parallel Progrmg: Sci & Engrg	3 or 4
CS 421	Programming Languages & Compilers	3 or 4	CS 421	Programming Languages & Compilers	3 or 4
CS 422	Programming Language Design	3 or 4	CS 422	Programming Language Design	3 or 4
CS 423	Operating Systems Design	3 or 4	CS 423	Operating Systems Design	3 or 4
CS 424	Real-Time Systems	3 or 4	CS 424	Real-Time Systems	3 or 4
CS 425	Distributed Systems	3 or 4	CS 425	Distributed Systems	3 or 4
CS 426	Compiler Construction	3 or 4	CS 426	Compiler Construction	3 or 4
CS 427	Software Engineering I	3 or 4	CS 427	Software Engineering I	3 or 4
CS 428	Software Engineering II	3 or 4	CS 428	Software Engineering II	3 or 4
CS 429	Software Engineering II, ACP	3	CS 429	Software Engineering II, ACP	3
CS 431	Embedded Systems	3 or 4	CS 431	Embedded Systems	3 or 4

CS 433	Computer System Organization	3 or 4
CS 435	Cloud Networking	3 or 4
CS 436	Computer Networking Laboratory	3 or 4
CS 438	Communication Networks	3 or 4
CS 439	Wireless Networks	3 or 4
CS 440	Artificial Intelligence	3 or 4
CS 445	Computational Photography	3 or 4
CS 446	Machine Learning	3 or 4
CS 447	Natural Language Processing	3 or 4
CS 450	Numerical Analysis	3 or 4
CS 460	Security Laboratory	3 or 4
CS 461	Computer Security I	4
CS 463	Computer Security II	3 or 4
CS 465	User Interface Design	4
CS 466	Introduction to Bioinformatics	3 or 4
CS 467	Social Visualization	3 or 4
CS 473	Algorithms	4
CS 475	Formal Models of Computation	3 or 4
CS 476	Program Verification	3 or 4
CS 477	Formal Software Development Methods	3 or 4
CS 481	Advanced Topics in Stochastic Processes & Applications	3 or 4
CS 484	Parallel Programming	3 or 4
CS 398	Special Topics (As approved)	1 to 4
CS 498	Special Topics (As approved)	1 to 4
ECE 297	Individual Study	1
ECE 304	Photonic Devices	3
ECE 307	Techniques for Engrg Decisions	3
ECE 310	Digital Signal Processing	3
ECE 311	Digital Signal Processing Lab	1
ECE 314	Probability in Engineering Lab	1
ECE 329	Fields and Waves I	3
ECE 330	Power Ckts & Electromechanics	3
ECE 333	Green Electric Energy	3
ECE 340	Semiconductor Electronics	3
ECE 342	Electronic Circuits	3
ECE 343	Electronic Circuits Laboratory	1
ECE 350	Fields and Waves II	3
ECE 365	Data Science and Engineering	3
ECE 380	Biomedical Imaging	3
ECE 395	Advanced Digital Projects Lab	2 or 3
ECE 396	Honors Project	1 to 4
ECE 397	Individual Study in ECE	0 to 4
ECE 402	Electronic Music Synthesis	3

CS 433	Computer System Organization	3 or 4
CS 435	Cloud Networking	3 or 4
CS 436	Computer Networking Laboratory	3 or 4
CS 438	Communication Networks	3 or 4
CS 439	Wireless Networks	3 or 4
CS 440	Artificial Intelligence	3 or 4
CS 445	Computational Photography	3 or 4
CS 446	Machine Learning	3 or 4
CS 447	Natural Language Processing	3 or 4
CS 450	Numerical Analysis	3 or 4
CS 460	Security Laboratory	3 or 4
CS 461	Computer Security I	4
CS 463	Computer Security II	3 or 4
CS 465	User Interface Design	4
CS 466	Introduction to Bioinformatics	3 or 4
CS 467	Social Visualization	3 or 4
CS 473	Algorithms	4
CS 475	Formal Models of Computation	3 or 4
CS 476	Program Verification	3 or 4
CS 477	Formal Software Development Methods	3 or 4
CS 481	Advanced Topics in Stochastic Processes & Applications	3 or 4
CS 484	Parallel Programming	3 or 4
CS 398	Special Topics (As approved)	1 to 4
CS 498	Special Topics (As approved)	1 to 4
ECE 297	Individual Study	1
ECE 304	Photonic Devices	3
ECE 307	Techniques for Engrg Decisions	3
ECE 310	Digital Signal Processing	3
ECE 311	Digital Signal Processing Lab	1
ECE 314	Probability in Engineering Lab	1
ECE 329	Fields and Waves I	3
ECE 330	Power Ckts & Electromechanics	3
ECE 333	Green Electric Energy	3
ECE 340	Semiconductor Electronics	3
ECE 342	Electronic Circuits	3
ECE 343	Electronic Circuits Laboratory	1
ECE 350	Fields and Waves II	3
ECE 365	Data Science and Engineering	3
ECE 380	Biomedical Imaging	3
ECE 395	Advanced Digital Projects Lab	2 or 3
ECE 396	Honors Project	1 to 4
ECE 397	Individual Study in ECE	0 to 4
ECE 402	Electronic Music Synthesis	3

ECE 403	Audio Engineering	3	ECE 403	Audio Engineering	3
ECE 407	Cryptography	3 or 4	ECE 407	Cryptography	3 or 4
ECE 408	Applied Parallel Programming	4	ECE 408	Applied Parallel Programming	4
ECE 411	Computer Organization & Design	4	ECE 411	Computer Organization & Design	4
ECE 412	Microcomputer Laboratory	3	ECE 412	Microcomputer Laboratory	3
ECE 414	Biomedical Instrumentation	3	ECE 414	Biomedical Instrumentation	3
ECE 415	Biomedical Instrumentation Lab	2	ECE 415	Biomedical Instrumentation Lab	2
ECE 416	Biosensors	3	ECE 416	Biosensors	3
ECE 417	Multimedia Signal Processing	4	ECE 417	Multimedia Signal Processing	4
ECE 418	Image & Video Processing	4	ECE 418	Image & Video Processing	4
ECE 419	Security Laboratory	3 or 4	ECE 419	Security Laboratory	3 or 4
ECE 420	Embedded DSP Laboratory	2	ECE 420	Embedded DSP Laboratory	2
ECE 422	Computer Security I	4	ECE 422	Computer Security I	4
ECE 424	Computer Security II	3 or 4	ECE 424	Computer Security II	3 or 4
ECE 425	Intro to VLSI System Design	3	ECE 425	Intro to VLSI System Design	3
ECE 428	Distributed Systems	3 or 4	ECE 428	Distributed Systems	3 or 4
ECE 431	Electric Machinery	4	ECE 431	Electric Machinery	4
ECE 432	Advanced Electric Machinery	3	ECE 432	Advanced Electric Machinery	3
ECE 435	Computer Networking Laboratory	3 or 4	ECE 435	Computer Networking Laboratory	3 or 4
ECE 437	Sensors and Instrumentation	3	ECE 437	Sensors and Instrumentation	3
ECE 438	Communication Networks	3 or 4	ECE 438	Communication Networks	3 or 4
ECE 439	Wireless Networks	3 or 4	ECE 439	Wireless Networks	3 or 4
ECE 441	Physcs & Modeling Semicond Dev	3	ECE 441	Physcs & Modeling Semicond Dev	3
ECE 442	Silicon Photonics	3 or 4	ECE 442	Silicon Photonics	3 or 4
ECE 443	LEDs and Solar Cells	4	ECE 443	LEDs and Solar Cells	4
ECE 444	IC Device Theory & Fabrication	4	ECE 444	IC Device Theory & Fabrication	4
ECE 445	Senior Design Project Lab	4	ECE 445	Senior Design Project Lab	4
ECE 446	Principles of Experimental Research in Electrical Engineering	4	ECE 446	Principles of Experimental Research in Electrical Engineering	4
ECE 447	Active Microwave Ckt Design	3	ECE 447	Active Microwave Ckt Design	3
ECE 448	Artificial Intelligence	3 or 4	ECE 448	Artificial Intelligence	3 or 4
ECE 451	Adv Microwave Measurements	3	ECE 451	Adv Microwave Measurements	3
ECE 452	Electromagnetic Fields	3	ECE 452	Electromagnetic Fields	3
ECE 453	Wireless Communication Systems	4	ECE 453	Wireless Communication Systems	4
ECE 454	Antennas	3	ECE 454	Antennas	3
ECE 455	Optical Electronics	3 or 4	ECE 455	Optical Electronics	3 or 4
ECE 456	Global Nav Satellite Systems	4	ECE 456	Global Nav Satellite Systems	4
ECE 457	Microwave Devices & Circuits	3	ECE 457	Microwave Devices & Circuits	3
ECE 458	Applic of Radio Wave Propag	3	ECE 458	Applic of Radio Wave Propag	3
ECE 459	Communications Systems	3	ECE 459	Communications Systems	3
ECE 460	Optical Imaging	4	ECE 460	Optical Imaging	4

ECE 461	Digital Communications	3
ECE 462	Logic Synthesis	3
ECE 463	Digital Communications Lab	2
ECE 464	Power Electronics	3
ECE 465	Optical Communications Systems	3
ECE 466	Optical Communications Lab	1
ECE 467	Biophotonics	3
ECE 468	Optical Remote Sensing	3
ECE 469	Power Electronics Laboratory	2
ECE 470	Introduction to Robotics	4
ECE 472	Biomedical Ultrasound Imaging	3
ECE 473	Fund of Engrg Acoustics	3 or 4
ECE 476	Power System Analysis	3
ECE 478	Formal Software Development Methods	3 or 4
ECE 480	Magnetic Resonance Imaging	3 or 4
ECE 481	Nanotechnology	4
ECE 482	Digital IC Design	3
ECE 483	Analog IC Design	3
ECE 485	MEMS Devices & Systems	3
ECE 486	Control Systems	4
ECE 487	Intro Quantum Electr for EEs	3
ECE 488	Compound Semicond & Devices	3
ECE 489	Robot Dynamics and Control	4
ECE 490	Introduction to Optimization	3 or 4
ECE 491	Numerical Analysis	3 or 4
ECE 492	Parallel Progrmg: Sci & Engrg	3 or 4
ECE 493	Advanced Engineering Math	3 or 4
ECE 495	Photonic Device Laboratory	3
ECE 496	Senior Research Project	2
ECE 499	Senior Thesis	2
ECE 298	Special Topics in ECE (As approved)	1 to 4
ECE 398	Special Topics in ECE (As approved)	0 to 4
ECE 498	Special Topics in ECE (As approved)	0 to 4
ENG 491	Interdisciplinary Design Proj (CubeSat, Solar Decathlon, Formula SAE, Baja SAE or by approval)	1 to 4
GEOL 107	Physical Geology	4
GEOL 208	History of the Earth System	4
GEOL 333	Earth Materials and the Env	4
GEOL 380	Environmental Geology	4

ECE 461	Digital Communications	3
ECE 462	Logic Synthesis	3
ECE 463	Digital Communications Lab	2
ECE 464	Power Electronics	3
ECE 465	Optical Communications Systems	3
ECE 466	Optical Communications Lab	1
ECE 467	Biophotonics	3
ECE 468	Optical Remote Sensing	3
ECE 469	Power Electronics Laboratory	2
ECE 470	Introduction to Robotics	4
ECE 472	Biomedical Ultrasound Imaging	3
ECE 473	Fund of Engrg Acoustics	3 or 4
ECE 476	Power System Analysis	3
ECE 478	Formal Software Development Methods	3 or 4
ECE 480	Magnetic Resonance Imaging	3 or 4
ECE 481	Nanotechnology	4
ECE 482	Digital IC Design	3
ECE 483	Analog IC Design	3
ECE 485	MEMS Devices & Systems	3
ECE 486	Control Systems	4
ECE 487	Intro Quantum Electr for EEs	3
ECE 488	Compound Semicond & Devices	3
ECE 489	Robot Dynamics and Control	4
ECE 490	Introduction to Optimization	3 or 4
ECE 491	Numerical Analysis	3 or 4
ECE 492	Parallel Progrmg: Sci & Engrg	3 or 4
ECE 493	Advanced Engineering Math	3 or 4
ECE 495	Photonic Device Laboratory	3
ECE 496	Senior Research Project	2
ECE 499	Senior Thesis	2
ECE 298	Special Topics in ECE (As approved)	1 to 4
ECE 398	Special Topics in ECE (As approved)	0 to 4
ECE 498	Special Topics in ECE (As approved)	0 to 4
ENG 491	Interdisciplinary Design Proj (CubeSat, Solar Decathlon, Formula SAE, Baja SAE or by approval)	1 to 4
GEOL 107	Physical Geology	4
GEOL 208	History of the Earth System	4
GEOL 333	Earth Materials and the Env	4
GEOL 380	Environmental Geology	4

GEOL 411	Structural Geol and Tectonics	4	GEOL 411	Structural Geol and Tectonics	4
GEOL 417	Geol Field Methods, Western US	6	GEOL 417	Geol Field Methods, Western US	6
GEOL 432	Mineralogy and Mineral Optics	4	GEOL 432	Mineralogy and Mineral Optics	4
GEOL 436	Petrology and Petrography	4	GEOL 436	Petrology and Petrography	4
GEOL 440	Sedimentology and Stratigraphy	4	GEOL 440	Sedimentology and Stratigraphy	4
GEOL 450	Probing the Earth's Interior	3	GEOL 450	Probing the Earth's Interior	3
GEOL 452	Introduction to Geophysics	4	GEOL 452	Introduction to Geophysics	4
GEOL 460	Geochemistry	3	GEOL 460	Geochemistry	3
IE 310	Deterministic Models in Optimization	3	IE 310	Deterministic Models in Optimization	3
IE 330	Industrial Quality Control	3	IE 330	Industrial Quality Control	3
IE 360	Facilities Planning and Design	3	IE 360	Facilities Planning and Design	3
IE 361	Production Planning & Control	3	IE 361	Production Planning & Control	3
IE 400	Design & Anlys of Experiments	3 or 4	IE 400	Design & Anlys of Experiments	3 or 4
IE 410	Advanced Topics in Stochastic Processes & Applications	3 or 4	IE 410	Advanced Topics in Stochastic Processes & Applications	3 or 4
IE 411	Optimization of Large Systems	3 or 4	IE 411	Optimization of Large Systems	3 or 4
IE 412	OR Models for Mfg Systems	3 or 4	IE 412	OR Models for Mfg Systems	3 or 4
IE 413	Simulation	3 or 4	IE 413	Simulation	3 or 4
IE 420	Financial Engineering	3 or 4	IE 420	Financial Engineering	3 or 4
IE 430	Economic Found of Quality Syst	3 or 4	IE 430	Economic Found of Quality Syst	3 or 4
IE 431	Design for Six Sigma	3	IE 431	Design for Six Sigma	3
IB 150	Organismal & Evolutionary Biol	4	IB 150	Organismal & Evolutionary Biol	4
IB 202	Physiology	3 or 4	IB 202	Physiology	3 or 4
IB 203	Ecology	4	IB 203	Ecology	4
IB 204	Genetics	3 or 4	IB 204	Genetics	3 or 4
IB 302	Evolution	4	IB 302	Evolution	4
IB 335	Plant Systematics	4	IB 335	Plant Systematics	4
IB 348	Fish and Wildlife Ecology	3	IB 348	Fish and Wildlife Ecology	3
IB 368	Vertebrate Natural History	4	IB 368	Vertebrate Natural History	4
IB 401	Introduction to Entomology	3 or 4	IB 401	Introduction to Entomology	3 or 4
IB 405	Evolution of Traits and Genomes	3	IB 405	Evolution of Traits and Genomes	3
IB 420	Plant Physiology	3	IB 420	Plant Physiology	3
IB 421	Photosynthesis	3	IB 421	Photosynthesis	3
IB 426	Env and Evol Physl of Animals	3	IB 426	Env and Evol Physl of Animals	3
IB 427	Insect Physiology	4	IB 427	Insect Physiology	4
IB 431	Behavioral Ecology	3	IB 431	Behavioral Ecology	3
IB 432	Genes and Behavior	3	IB 432	Genes and Behavior	3
IB 440	Plants and Global Change	3	IB 440	Plants and Global Change	3
IB 443	Evolutionary Ecology	3	IB 443	Evolutionary Ecology	3
IB 444	Insect Ecology	3 or 4	IB 444	Insect Ecology	3 or 4
IB 451	Conservation Biology	4	IB 451	Conservation Biology	4
IB 452	Ecosystem Ecology	3	IB 452	Ecosystem Ecology	3
IB 453	Community Ecology	3	IB 453	Community Ecology	3
IB 461	Ornithology	4	IB 461	Ornithology	4
IB 462	Mammalogy	4	IB 462	Mammalogy	4
IB 463	Ichthyology	4	IB 463	Ichthyology	4

IB 464	Herpetology	4
IB 467	Principles of Systematics	4
IB 468	Insect Classification and Evol	4
IB 471	General Mycology	4
IB 472	Plant Molecular Biology	1
IB 473	Plant Genomics	1
IB 481	Vector-borne Diseases	4
IB 482	Insect Pest Management	3
IB 483	Insect Pathology	3
IB 485	Environ Toxicology & Health	3
IB 486	Pesticide Toxicology	3 or 4
LING 300	Anat & Physiol Spch Mechanism	4
LING 406	Introduction to Computational Linguistics	3 or 4
LING 407	Logic and Linguistic Analysis	3 or 4
LING 427	Language and the Brain	3 or 4
MSE 280	Engineering Materials	3
Material Science and Engineering (MSE): All 300 and 400 level courses		
MATH 347	Fundamental Mathematics	3
MATH 348	Fundamental Mathematics-ACP	4
MATH 357	Numerical Methods I	3
MATH 402	Non Euclidean Geometry	3 or 4
MATH 403	Euclidean Geometry	3 or 4
MATH 412	Graph Theory	3 or 4
MATH 413	Intro to Combinatorics	3 or 4
MATH 414	Mathematical Logic	3 or 4
MATH 417	Intro to Abstract Algebra	3 or 4
MATH 418	Intro to Abstract Algebra II	3 or 4
MATH 423	Differential Geometry	3 or 4
MATH 424	Honors Real Analysis	3
MATH 425	Honors Advanced Analysis	3
MATH 427	Honors Abstract Algebra	3
MATH 428	Honors Topics in Mathematics	3
MATH 432	Set Theory and Topology	3 or 4
MATH 442	Intro Partial Diff Equations	3 or 4
MATH 444	Elementary Real Analysis	3 or 4
MATH 446	Applied Complex Variables	3 or 4
MATH 447	Real Variables	3 or 4
MATH 448	Complex Variables	3 or 4
MATH 450	Numerical Analysis	3 or 4
MATH 453	Number Theory	3 or 4
MATH 473	Algorithms	4
MATH 475	Formal Models of Computation	3 or 4
MATH 481	Vector and Tensor Analysis	3 or 4
MATH 482	Linear Programming	3 or 4

IB 464	Herpetology	4
IB 467	Principles of Systematics	4
IB 468	Insect Classification and Evol	4
IB 471	General Mycology	4
IB 472	Plant Molecular Biology	1
IB 473	Plant Genomics	1
IB 481	Vector-borne Diseases	4
IB 482	Insect Pest Management	3
IB 483	Insect Pathology	3
IB 485	Environ Toxicology & Health	3
IB 486	Pesticide Toxicology	3 or 4
LING 300	Anat & Physiol Spch Mechanism	4
LING 406	Introduction to Computational Linguistics	3 or 4
LING 407	Logic and Linguistic Analysis	3 or 4
LING 427	Language and the Brain	3 or 4
MSE 280	Engineering Materials	3
Material Science and Engineering (MSE): All 300 and 400 level		
MATH 347	Fundamental Mathematics	3
MATH 348	Fundamental Mathematics-ACP	4
MATH 357	Numerical Methods I	3
MATH 402	Non Euclidean Geometry	3 or 4
MATH 403	Euclidean Geometry	3 or 4
MATH 412	Graph Theory	3 or 4
MATH 413	Intro to Combinatorics	3 or 4
MATH 414	Mathematical Logic	3 or 4
MATH 417	Intro to Abstract Algebra	3 or 4
MATH 418	Intro to Abstract Algebra II	3 or 4
MATH 423	Differential Geometry	3 or 4
MATH 424	Honors Real Analysis	3
MATH 425	Honors Advanced Analysis	3
MATH 427	Honors Abstract Algebra	3
MATH 428	Honors Topics in Mathematics	3
MATH 432	Set Theory and Topology	3 or 4
MATH 442	Intro Partial Diff Equations	3 or 4
MATH 444	Elementary Real Analysis	3 or 4
MATH 446	Applied Complex Variables	3 or 4
MATH 447	Real Variables	3 or 4
MATH 448	Complex Variables	3 or 4
MATH 450	Numerical Analysis	3 or 4
MATH 453	Number Theory	3 or 4
MATH 473	Algorithms	4
MATH 475	Formal Models of Computation	3 or 4
MATH 481	Vector and Tensor Analysis	3 or 4
MATH 482	Linear Programming	3 or 4

MATH 484	Nonlinear Programming	3 or 4	MATH 484	Nonlinear Programming	3 or 4
MATH 487	Advanced Engineering Math	3 or 4	MATH 487	Advanced Engineering Math	3 or 4
MATH 489	Dynamics & Differential Eqns	3 or 4	MATH 489	Dynamics & Differential Eqns	3 or 4
MCB 150	Molec & Cellular Basis of Life	4	MCB 150	Molec & Cellular Basis of Life	4
MCB 250	Molecular Genetics	3	MCB 250	Molecular Genetics	3
MCB 251	Exp Techniqs in Molecular Biol	2	MCB 251	Exp Techniqs in Molecular Biol	2
MCB 252	Cells, Tissues & Development	3	MCB 252	Cells, Tissues & Development	3
MCB 253	Exp Techniqs in Cellular Biol	2	MCB 253	Exp Techniqs in Cellular Biol	2
MCB 300	Microbiology	3	MCB 300	Microbiology	3
MCB 301	Experimental Microbiology	3	MCB 301	Experimental Microbiology	3
MCB 314	Introduction to Neurobiology	3	MCB 314	Introduction to Neurobiology	3
MCB 316	Genetics and Disease	4	MCB 316	Genetics and Disease	4
MCB 354	Biochem & Phys Basis of Life	3	MCB 354	Biochem & Phys Basis of Life	3
MCB 400	Cancer Cell Biology	3	MCB 400	Cancer Cell Biology	3
MCB 401	Cellular Physiology	3	MCB 401	Cellular Physiology	3
MCB 402	Sys & Integrative Physiology	3	MCB 402	Sys & Integrative Physiology	3
MCB 403	Cell & Membrane Physiology Lab	1 or 2	MCB 403	Cell & Membrane Physiology Lab	1 or 2
MCB 404	Sys & Integrative Physiol Lab	1 to 2	MCB 404	Sys & Integrative Physiol Lab	1 to 2
MCB 406	Gene Expression & Regulation	3	MCB 406	Gene Expression & Regulation	3
MCB 408	Immunology	3	MCB 408	Immunology	3
MCB 410	Developmental Biology, Stem Cells and Regenerative Medicine	3	MCB 410	Developmental Biology, Stem Cells and Regenerative Medicine	3
MCB 413	Endocrinology	3	MCB 413	Endocrinology	3
MCB 419	Brain, Behavior & Info Process	3	MCB 419	Brain, Behavior & Info Process	3
MCB 421	Microbial Genetics	3	MCB 421	Microbial Genetics	3
MCB 424	Microbial Biochemistry	3	MCB 424	Microbial Biochemistry	3
MCB 426	Bacterial Pathogenesis	3	MCB 426	Bacterial Pathogenesis	3
MCB 430	Molecular Microbiology	3	MCB 430	Molecular Microbiology	3
MCB 431	Microbial Physiology	3	MCB 431	Microbial Physiology	3
MCB 433	Virology & Viral Pathogenesis	3	MCB 433	Virology & Viral Pathogenesis	3
MCB 435	Evolution of Infectious Disease	3	MCB 435	Evolution of Infectious Disease	3
MCB 446	Physical Biochemistry	3	MCB 446	Physical Biochemistry	3
MCB 480	Eukaryotic Cell Signaling	3	MCB 480	Eukaryotic Cell Signaling	3
ME 200	Thermodynamics	3	ME 200	Thermodynamics	3
ME 310	Fundamentals of Fluid Dynamics	4	ME 310	Fundamentals of Fluid Dynamics	4
ME 320	Heat Transfer	4	ME 320	Heat Transfer	4
ME 330	Engineering Materials	4	ME 330	Engineering Materials	4
ME 340	Dynamics of Mechanical Systems	3.5	ME 340	Dynamics of Mechanical Systems	3.5
ME 370	Mechanical Design I	3	ME 370	Mechanical Design I	3
ME 371	Mechanical Design II	3	ME 371	Mechanical Design II	3
ME 400	Energy Conversion Systems	3 or 4	ME 400	Energy Conversion Systems	3 or 4
ME 401	Refrigeration and Cryogenics	3 or 4	ME 401	Refrigeration and Cryogenics	3 or 4

ME 402	Design of Thermal Systems	3 or 4	ME 402	Design of Thermal Systems	3 or 4
ME 403	Internal Combustion Engines	3 or 4	ME 403	Internal Combustion Engines	3 or 4
ME 404	Intermediate Thermodynamics	4	ME 404	Intermediate Thermodynamics	4
ME 410	Intermediate Gas Dynamics	3 or 4	ME 410	Intermediate Gas Dynamics	3 or 4
ME 411	Viscous Flow & Heat Transfer	4	ME 411	Viscous Flow & Heat Transfer	4
ME 412	Numerical Thermo-Fluid Mechs	2 to 4	ME 412	Numerical Thermo-Fluid Mechs	2 to 4
ME 420	Intermediate Heat Transfer	4	ME 420	Intermediate Heat Transfer	4
ME 430	Failure of Engrg Materials	3 or 4	ME 430	Failure of Engrg Materials	3 or 4
ME 431	Mechanical Component Failure	3 or 4	ME 431	Mechanical Component Failure	3 or 4
ME 440	Kinem & Dynamics of Mech Syst	3 or 4	ME 440	Kinem & Dynamics of Mech Syst	3 or 4
ME 445	Introduction to Robotics	4	ME 445	Introduction to Robotics	4
ME 451	Computer-Aided Mfg Systems	3 or 4	ME 451	Computer-Aided Mfg Systems	3 or 4
ME 452	Num Control of Mfg Processes	3 or 4	ME 452	Num Control of Mfg Processes	3 or 4
ME 460	Industrial Control Systems	4	ME 460	Industrial Control Systems	4
ME 461	Computer Cntrl of Mech Systems	3 or 4	ME 461	Computer Cntrl of Mech Systems	3 or 4
ME 471	Finite Element Analysis	3 or 4	ME 471	Finite Element Analysis	3 or 4
ME 472	Introduction to Tribology	3 or 4	ME 472	Introduction to Tribology	3 or 4
ME 485	MEMS Devices & Systems	3	ME 485	MEMS Devices & Systems	3
ME 487	MEMS-NEMS Theory & Fabrication	4	ME 487	MEMS-NEMS Theory & Fabrication	4
MUS 407	Elect Music Techniques I	3	MUS 407	Elect Music Techniques I	3
MUS 409	Elec Music Techniques II	2	MUS 409	Elec Music Techniques II	2
NEUR 453	Cog Neuroscience of Vision	3 or 4	NEUR 453	Cog Neuroscience of Vision	3 or 4
NPRE 201	Energy Systems	2 or 3	NPRE 201	Energy Systems	2 or 3
NPRE 247	Modeling Nuclear Energy System	3	NPRE 247	Modeling Nuclear Energy System	3
			NPRE 330	Materials in Nuclear Engngineering	3
NPRE 402	Nuclear Power Engineering	3 or 4	NPRE 402	Nuclear Power Engineering	3 or 4
NPRE 412	Nuclear Power Econ & Fuel Mgmt	3 or 4	NPRE 412	Nuclear Power Econ & Fuel Mgmt	3 or 4
NPRE 421	Plasma and Fusion Science	3	NPRE 421	Plasma and Fusion Science	3
NPRE 423	Plasma Laboratory	2	NPRE 423	Plasma Laboratory	2
NPRE 429	Plasma Engineering	3	NPRE 429	Plasma Engineering	3
NPRE 431	Course Not Found				
NPRE 432	Nuclear Engrg Materials Lab	2	NPRE 432	Nuclear Engrg Materials Lab	2
NPRE 435	Radiological Imaging	3	NPRE 435	Radiological Imaging	3
NPRE 441	Radiation Protection	4	NPRE 441	Radiation Protection	4
NPRE 442	Radioactive Waste Management	3	NPRE 442	Radioactive Waste Management	3
NPRE 444	Nuclear Analytical Methods Lab	2 or 3	NPRE 444	Nuclear Analytical Methods Lab	2 or 3
NPRE 446	Radiation Interact w/Matter I	3	NPRE 446	Radiation Interact w/Matter I	3
NPRE 447	Radiation Interact w/Matter II	3	NPRE 447	Radiation Interact w/Matter II	3
NPRE 448	Nuclear Syst Engrg & Design	4	NPRE 448	Nuclear Syst Engrg & Design	4

NPRE 451	NPRE Laboratory	3	NPRE 451	NPRE Laboratory	3
NPRE 455	Neutron Diffusion & Transport	4	NPRE 455	Neutron Diffusion & Transport	4
NPRE 457	Safety Anlys Nucl Reactor Syst	3 or 4	NPRE 457	Safety Anlys Nucl Reactor Syst	3 or 4
NPRE 458	Design in NPRE	4	NPRE 458	Design in NPRE	4
NPRE 470	Fuel Cells & Hydrogen Sources	3	NPRE 470	Fuel Cells & Hydrogen Sources	3
NPRE 475	Wind Power Systems	3 or 4	NPRE 475	Wind Power Systems	3 or 4
PHYS 225	Relativity & Math Applications	2	PHYS 225	Relativity & Math Applications	2
PHYS 325	Classical Mechanics I	3	PHYS 325	Classical Mechanics I	3
PHYS 326	Classical Mechanics II	3	PHYS 326	Classical Mechanics II	3
PHYS 401	Classical Physics Lab	3	PHYS 401	Classical Physics Lab	3
PHYS 402	Light	3 or 4	PHYS 402	Light	3 or 4
PHYS 403	Modern Experimental Physics	4 or 5	PHYS 403	Modern Experimental Physics	4 or 5
PHYS 406	Acoustical Physics of Music	4	PHYS 406	Acoustical Physics of Music	4
PHYS 419	Space, Time, and Matter-ACP	3 or 4	PHYS 419	Space, Time, and Matter-ACP	3 or 4
PHYS 420	Space, Time, and Matter	2	PHYS 420	Space, Time, and Matter	2
PHYS 427	Thermal & Statistical Physics	4	PHYS 427	Thermal & Statistical Physics	4
PHYS 460	Condensed Matter Physics	4	PHYS 460	Condensed Matter Physics	4
PHYS 466	Atomic Scale Simulations	3 or 4	PHYS 466	Atomic Scale Simulations	3 or 4
PHYS 470	Subatomic Physics	4	PHYS 470	Subatomic Physics	4
PHYS 485	Atomic Phys & Quantum Theory	3	PHYS 485	Atomic Phys & Quantum Theory	3
PHYS 486	Quantum Physics I	4	PHYS 486	Quantum Physics I	4
PHYS 487	Quantum Physics II	4	PHYS 487	Quantum Physics II	4
PSYC 204	Intro to Brain and Cognition	3	PSYC 204	Intro to Brain and Cognition	3
SHS 200	General Phonetics	3	SHS 200	General Phonetics	3
SHS 240	Intro Sound & Hearing Science	3	SHS 240	Intro Sound & Hearing Science	3
SHS 300	Anat & Physiol Spch Mechanism	4	SHS 300	Anat & Physiol Spch Mechanism	4
SHS 301	General Speech Science	4	SHS 301	General Speech Science	4
SHS 320	Development of Spoken Language	3	SHS 320	Development of Spoken Language	3
SHS 450	Intro Audiol & Hear Disorders	4	SHS 450	Intro Audiol & Hear Disorders	4
SHS 470	Neural Bases Spch Lang	4	SHS 470	Neural Bases Spch Lang	4
STAT 420	Methods of Applied Statistics	3 or 4	STAT 420	Methods of Applied Statistics	3 or 4
STAT 424	Analysis of Variance	3 or 4	STAT 424	Analysis of Variance	3 or 4
STAT 425	Statistical Modeling I	3 or 4	STAT 425	Statistical Modeling I	3 or 4
STAT 428	Statistical Computing	3 or 4	STAT 428	Statistical Computing	3 or 4
STAT 429	Time Series Analysis	3 or 4	STAT 429	Time Series Analysis	3 or 4
STAT 440	Statistical Data Management	3 or 4	STAT 440	Statistical Data Management	3 or 4
SE 411	Reliability Engineering	3 or 4	SE 411	Reliability Engineering	3 or 4
SE 420	Digital Control Systems	4	SE 420	Digital Control Systems	4
SE 423	Mechatronics	3	SE 423	Mechatronics	3
SE 424	State Space Design for Control	3	SE 424	State Space Design for Control	3
TAM 211	Statics	3	TAM 211	Statics	3
TAM 212	Introductory Dynamics	3	TAM 212	Introductory Dynamics	3

TAM 251	Introductory Solid Mechanics	3	TAM 251	Introductory Solid Mechanics	3
TAM 324	Behavior of Materials	4	TAM 324	Behavior of Materials	4
TAM 335	Introductory Fluid Mechanics	4	TAM 335	Introductory Fluid Mechanics	4
TAM 412	Intermediate Dynamics	4	TAM 412	Intermediate Dynamics	4
TAM 435	Intermediate Fluid Mechanics	4	TAM 435	Intermediate Fluid Mechanics	4
TAM 445	Continuum Mechanics	4	TAM 445	Continuum Mechanics	4
TAM 451	Intermediate Solid Mechanics	4	TAM 451	Intermediate Solid Mechanics	4
Select one course from the following list of Electrical Engineering			**Select one course from the following list of Electrical**		
ECE 310	Digital Signal Processing	3	ECE 310	Digital Signal Processing	3
ECE 330	Power Ckts & Electromechanics	3	ECE 330	Power Ckts & Electromechanics	3
ECE 329	Fields and Waves I	3	ECE 329	Fields and Waves I	3
ECE 340	Semiconductor Electronics	3	ECE 340	Semiconductor Electronics	3
ECE 461	Digital Communications	3	ECE 461	Digital Communications	3
ECE 486	Control Systems	4	ECE 486	Control Systems	4
Select three courses from the following list of Advanced Computing			**Select three courses from the following list of Advanced**		
CS 357	Numerical Methods I	3	CS 357	Numerical Methods I	3
CS 411	Database Systems	3 or 4	CS 411	Database Systems	3 or 4
CS 412	Introduction to Data Mining	3 or 4	CS 412	Introduction to Data Mining	3 or 4
CS 414	Multimedia Systems	3 or 4	CS 414	Multimedia Systems	3 or 4
CS 418	Interactive Computer Graphics	3 or 4	CS 418	Interactive Computer Graphics	3 or 4
CS 419	Production Computer Graphics	3 or 4	CS 419	Production Computer Graphics	3 or 4
CS 420	Parallel Progrmg: Sci & Engrg	3 or 4	CS 420	Parallel Progrmg: Sci & Engrg	3 or 4
CS 421	Programming Languages & Compilers	3 or 4	CS 421	Programming Languages & Compilers	3 or 4
CS 423	Operating Systems Design	3 or 4	CS 423	Operating Systems Design	3 or 4
CS 424	Real-Time Systems	3 or 4	CS 424	Real-Time Systems	3 or 4
CS 425	Distributed Systems	3 or 4	CS 425	Distributed Systems	3 or 4
CS 426	Compiler Construction	3 or 4	CS 426	Compiler Construction	3 or 4
CS 431	Embedded Systems	3 or 4	CS 431	Embedded Systems	3 or 4
			CS 434	Mobile Computing & Application	3 or 4
			CS 437	Topics in Internet of Things	3 or 4
CS 441	Applied Machine Learning	3 or 4	CS 441	Applied Machine Learning	3 or 4
CS 436	Computer Networking Laboratory	3 or 4	CS 436	Computer Networking Laboratory	3 or 4
CS 438	Communication Networks	3 or 4	CS 438	Communication Networks	3 or 4
CS 440	Artificial Intelligence	3 or 4	CS 440	Artificial Intelligence	3 or 4
			CS 444	Deep Learning for Computer Vision	3 or 4
CS 446	Machine Learning	3 or 4	CS 446	Machine Learning	3 or 4
CS 450	Numerical Analysis	3 or 4	CS 450	Numerical Analysis	3 or 4
CS 461	Computer Security I	4	CS 461	Computer Security I	4
CS 475	Formal Models of Computation	3 or 4	CS 475	Formal Models of Computation	3 or 4
CS 476	Program Verification	3 or 4	CS 476	Program Verification	3 or 4
CS 477	Formal Software Development Methods	3 or 4	CS 477	Formal Software Development Methods	3 or 4

CS 483	Applied Parallel Programming	4
ECE 408	Applied Parallel Programming	4
ECE 411	Computer Organization & Design	4
ECE 412	Microcomputer Laboratory	3
ECE 419	Security Laboratory	3 or 4
ECE 422	Computer Security I	4
ECE 424	Computer Security II	3 or 4
ECE 425	Intro to VLSI System Design	3
ECE 428	Distributed Systems	3 or 4
ECE 435	Computer Networking Laboratory	3 or 4
ECE 438	Communication Networks	3 or 4
ECE 439	Wireless Networks	3 or 4
ECE 448	Artificial Intelligence	3 or 4
ECE 462	Logic Synthesis	3
ECE 470	Introduction to Robotics	4
ECE 478	Formal Software Development Methods	3 or 4
ECE 484	Principles of Safe Autonomy	4
ECE 491	Numerical Analysis	3 or 4
ECE 492	Parallel Progrmg: Sci & Engrg	3 or 4
Select one from the following list of Design Electives		
ECE 411	Computer Organization & Design	4
ECE 445	Senior Design Project Lab [6]	4
ECE 496	Senior Research Project (and ECE 499 - Senior Thesis) 6	4
Electives		
The Grainger College of Engineering Liberal Education course list, or		6
Free electives. Additional unrestricted course work, subject to certain		12
Total Hours of Curriculum to Graduate		**128**

[1] External transfer students take ENG 300 instead.

[2] MATH 220 *may be substituted, with four of the five credit hours applying toward the degree.* MATH 220 *is appropriate for students with no background in calculus.*

CS 483	Applied Parallel Programming	4
ECE 408	Applied Parallel Programming	4
ECE 411	Computer Organization & Design	4
ECE 412	Microcomputer Laboratory	3
ECE 419	Security Laboratory	3 or 4
ECE 422	Computer Security I	4
ECE 424	Computer Security II	3 or 4
ECE 425	Intro to VLSI System Design	3
ECE 428	Distributed Systems	3 or 4
ECE 435	Computer Networking Laboratory	3 or 4
ECE 438	Communication Networks	3 or 4
ECE 439	Wireless Networks	3 or 4
ECE 448	Artificial Intelligence	3 or 4
ECE 462	Logic Synthesis	3
ECE 470	Introduction to Robotics	4
ECE 478	Formal Software Development Methods	3 or 4
ECE 479	IoT and Cognitive Computing	4
ECE 484	Principles of Safe Autonomy	4
ECE 491	Numerical Analysis	3 or 4
ECE 492	Parallel Progrmg: Sci & Engrg	3 or 4
Select one from the following list of Design Electives		
ECE 411	Computer Organization & Design	4
ECE 445	Senior Design Project Lab	4
ECE 496	Senior Research Project	4
Free Electives		
Additional unrestricted course work, subject to certain		16
Total Hours of Curriculum to Graduate		**128**

111 Freshmen take ECE 110 for 3 credit hours. Lab-only version taken by transfer students (with special permission) is 1 credit hour.

4 MATH 213 may be substituted.

5 STAT 410 may be substituted.

6 *Advanced Composition may be satisfied by completing ECE 445 or ECE 496 and ECE 499 or a course within either the general education or free elective categories which has the Advanced Composition designation.*

7 The Grainger College of Engineering approved liberal education course list can be found here. Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.

8 The Grainger College of Engineering restrictions to free electives can be found here.

ILLINOIS

COLLEGE OF AGRICULTURAL, CONSUMER
& ENVIRONMENTAL SCIENCES

Office of the Dean
227 Mumford Hall, MC-710
1301 W. Gregory Drive
Urbana, IL 61801

January 13, 2022

Dear Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from our college. Grainger Engineering students will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

Sincerely,

Germán Bollero, Interim Dean

ILLINOIS

COLLEGE OF APPLIED HEALTH SCIENCES

Office of the Dean
110 Huff Hall, MC-586
1206 S. Fourth St.
Champaign, IL 61820

January 25, 2022

Dear Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from our college. Grainger Engineering students will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

While I support the move the give your students more freedom in course selection, it is important to express my concern that discontinuing your Liberal Education requirement may negatively impact my college's finances by reducing the IUs generated from lower enrollments in AHS courses. As you know, the current budget model rewards colleges financially based on the number of registrants in courses. I am hopeful that your students and advisors will continue to view AHS courses as relevant and valuable when they are selecting electives.

Sincerely,

Cheryl Hanley-Maxwell

Dean

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

College of Education
Undergraduate Student Academic Affairs Office
110 Education Building, MC-708
1310 S. Sixth St.
Champaign, IL 61820

Dear Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from our college. Grainger Engineering students will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

Sincerely,

Assistant Dean for Academic Affairs
College of Education | University of Illinois at Urbana-Champaign

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

College of Fine & Applied Arts

Office of the Dean
100 Architecture Building, MC-622
608 E. Lorado Taft Dr.
Champaign, IL 61820

21 December 2021

Rashid Bashir, Dean
306 Engineering Hall
1308 W. Green St.
M/C 266
Urbana, IL 61801

Dear Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from the College of Fine & Applied Arts. Grainger Engineering students will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

Sincerely,

Kevin Hamilton
Dean and Professor

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

College of Liberal Arts & Sciences
2090 Lincoln Hall, MC-448
702 S. Wright St.
Urbana, IL 61801

December 20, 2021

Dear Dean Bashir,

Thank you for informing the College of LAS of the proposed removal of the Liberal Education requirement in all undergraduate programs in the Grainger College of Engineering. I understand that this requirement includes an extensive list of courses from which your students could choose some, many of which are from our college. Grainger Engineering students will continue to be welcome to take our courses formerly on your Liberal Education list as free electives after the removal of this requirement from their programs of study.

Sincerely,

Venetria K. Patton
Harry E. Preble Dean

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

College of Media
Office of the Dean
119 Gregory Hall, MC-462
810 S. Wright St.
Urbana, IL 61801

January 13, 2022

Rashid Bashir, Dean
The Grainger College of Engineering
306 Engineering Hall
1308 W. Green Street
Urbana, IL 61801

Dear Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from our college. Grainger Engineering students will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

Sincerely,

Tracy Sulkin
Dean, College of Media

Gies College of Business
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

Office of the Dean
260 Wohlers Hall, 1206 S. 6th Street
Champaign, IL 61820
217.333.2747

December 13th, 2021

Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from Gies College of Business. Students from Grainger will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

Sincerely,

Jeffrey R. Brown
Dean, Gies College of Business

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

School of Information Sciences

501 E. Daniel St., MC-493
Champaign, IL 61820-6211

February 3, 2022

Dean Rashid Bashir
306 Engineering Hall
1308 West Green Street
Urbana, IL 61801

Dear Rashid,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in the Grainger College of Engineering. I understand that this requirement included an extensive list of courses that Grainger Engineering students could choose from, including some from the iSchool. This letter acknowledges that Grainger Engineering students will continue to be able to enroll in courses as articulated and constrained in Course Explorer and formerly on your Liberal Education list as Free Electives, after the removal of this requirement.

Sincerely,

Eunice Santos

Eunice Santos
Professor and Dean

From: Hanley-Maxwell, Cheryl D <cherylhm@illinois.edu>
Sent: Monday, February 14, 2022 3:57 PM
To: Miller, Nolan H <nmiller@illinois.edu>
Subject: RE: Senate Ed Pol - Re: change to Grainger Liberal Education requirement

That's fine. Thanks for asking

CHERYL D HANLEY-MAXWELL
Dean

University of Illinois at Urbana-Champaign
College of Applied Health Sciences
108 Huff Hall
1206 S Fourth | M/C 586
Champaign, IL 61820
217.333.2131 | cherylhm@illinois.edu
www.ahs.illinois.edu
(217) 333-0404 (FAX)

Human kindness has never weakened the stamina or softened the fiber of a free people. A nation does not have to be cruel to be tough. -- President Franklin D. Roosevelt

From: Miller, Nolan H <nmiller@illinois.edu>
Sent: Monday, February 14, 2022 1:49 PM
To: Hanley-Maxwell, Cheryl D <cherylhm@illinois.edu>
Subject: RE: Senate Ed Pol - Re: change to Grainger Liberal Education requirement

Dear Cheryl,

Thanks again for talking with me about the changes to the Grainger BS programs. I read the statement you sent to the committee today. The Chair would like to include it in the record that is forwarded to the Senate. Is it ok to include the email you sent below?

Thanks,

Nolan

_____

NOLAN H MILLER
Daniel and Cynthia Mah Helle Professor in Finance | Department of Finance
Director, Center for Business and Public Policy
Gies College of Business | University of Illinois at Urbana-Champaign
217.244.2847 | nmiller@illinois.edu | http://www.business.illinois.edu/nmiller

From: Hanley-Maxwell, Cheryl D <cherylhm@illinois.edu>
Sent: Thursday, February 10, 2022 1:49 PM
To: Miller, Nolan H <nmiller@illinois.edu>
Subject: RE: Senate Ed Pol - Re: change to Grainger Liberal Education requirement

Hi Nolan –

I appreciate what Ed Pol does in juggling the interests and concerns of the various programs across the campus, while keeping the students in mind. I served on a committee like this at my previous institution and know that it all boils down to what is best for the students' learning. Thanks for reminding me of that.

Here is a statement: While the Grainger proposal has the potential to financially affect AHS, we want to affirm another college's right to control their program requirements and student experiences, ensuring the best possible outcomes for their students. As a result, AHS supports this proposal and hopes that Grainger advisors will recognize the valuable contribution AHS classes make to the education of their students and continue to encourage them to consider relevant and/or high interest classes in AHS.

Hope this works!

Cheryl

CHERYL D HANLEY-MAXWELL, PHD
Dean

University of Illinois at Urbana-Champaign
College of Applied Health Sciences
108 Huff Hall
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Human kindness has never weakened the stamina or softened the fiber of a free people. A nation does not have to be cruel to be tough. -- President Franklin D. Roosevelt