The College of New Jersey
School of Engineering
Electrical and Computer Engineering Department

Electrical and Computer Engineering Curricula
Bachelor of Science in Electrical Engineering (03/07/2024 Update)
Bachelor of Science in Computer Engineering (03/07/2024 Update)
Learn More About ECE: https://bit.ly/ECEatTCNJvideo

Proposed, Revised ECE Curricula (Effective for Class of 2025)
Attention (Rising) Seniors! Note that we have made some recent curricular changes. If you will graduate before or during Summer 2024, then you must follow the alternate curricula provided [here for Electrical Engineers] and [here for Computer Engineers].

Table 1: Updated ECE Curricula For Students Graduating After (Not During) Summer 2024

Course Name	Course Number	Prereqs	Coreqs	Required For Electrical Engineering	Required For Computer Engineering?	CU	Notes
Fall Freshman Year	Course Units:	EE=4.5, CompE=4.5		**Req for Electrical?**	**Req for Computer?**	CU	
Introduction to Engineering	ENG095			yes	yes	0.0	
Fundamentals of Engineering Design (aka. Freshman Design Course)	ENG144			yes	yes	0.5	
Calculus A	MAT127	see note below		yes	yes	1.0	
General Physics I	PHY201		MAT127	yes	yes	1.0	
First-Year Writing (if not exempted)*	FYW102			yes	yes	0.0	
Creative Design	TST161			yes	yes	1.0	
Principles of Microeconomics	ECO101	MAT095 OR MAT096		yes	yes	1.0	
Spring Freshman Year	Course Units:	EE=4.5, CompE=4.5		**Req for Electrical?**	**Req for Computer?**	CU	
Calculus B	MAT128	MAT127 OR MAT125		yes	yes	1.0	
General Physics II	PHY202	PHY201 AND MAT 127	MAT128	yes	yes	1.0	
Computer Science I	CSC220			yes	yes	1.0	

Course	Code	Prereq		Req for Electrical?	Req for Computer?	CU	Notes
ECE-Specific Freshman Design Section	ELC145		ENG144	yes	yes	0.5	
First Year Seminar*	FYS16X			yes	yes	1.0	
Fall Sophomore Year	Course Units:	EE=4.0, CompE=4.0		**Req for Electrical?**	**Req for Computer?**	CU	
Circuits Analysis	ENG212	PHY202 (>=C-)	ENG272	yes	yes	1.0	Class Sometimes Offered in Spring.
Adv. Engineering Mathematics I	ENG272	MAT128		yes	yes	1.0	
Digital Circuits and Microprocessors	ENG312	CSC215 or CSC220		yes	yes	1.0	
Computer Science II (CompE Only)	CSC230	CSC220 (>=C)		no	yes	1.0	**For Computer Students Only.**
Modern Physics (EE Only)	PHY321	MAT128 AND PHY202		yes	no	1.0	**For Electrical Students Only.**
Spring Sophomore Year	Course Units:	EE=4.5, CompE=5.5		**Req for Electrical?**	**Req for Computer?**	CU	
Electronics	ELC251	ENG212 AND ENG272		yes	yes	1.0	
Circuits Analysis Laboratory	ENG214		ENG212	yes	yes	0.5	
Systems and Signals	ELC321		ENG212	yes	yes	1.0	
Discrete Structures (CompE Only)	CSC270	CSC220 (>=C) OR CSC230 (>=C)	MAT127	no	yes	1.0	**For Computer Students Only.**
Multivariable Calculus	MAT229	MAT128		yes	yes	1.0	
Mathematics Elective*	ENG342 or STA215	varies		yes	yes	1.0	Computer Students Can Push This to Next Semester
Fall Junior Year	Course Units:	EE=4.5, CompE=3.5		**Req for Electrical?**	**Req for Computer?**	CU	
Engineering Seminar III	ENG093			yes	yes	0.0	
Communication Systems (EE Only)	ELC341	ELC251 AND ELC321		yes	no	1.0	**For Electrical Students Only.**
Embedded Systems with Lab	ELC411	ELC251 AND ELC312		yes	yes	1.0	
Electronics Lab	ELC333		ELC251	yes	yes	0.5	
Computer Architecture and Org.	ELC451	ENG312		yes	yes	1.0	
Technical Elective: ECE Discipline or Engineering (by advisement)	TechE	At least ELC251 AND ELC321		yes	yes	1.0	

Spring Junior Year	Course Units:	EE=5.0, CompE=4.5		Req for Electrical?	Req for Computer?	CU	
Engineering Seminar IV	ENG094			yes	yes	0.0	
Control Systems	ENG352	ENG212 AND ENG272		yes	yes	1.0	
Computer Engineering Laboratory I	ELC363		ELC451	yes	yes	0.5	
Engineering Electromagnetics (EE Only)	ELC361	ENG212 AND MAT229		yes	no	1.0	For Electrical Students Only.
Wireless and Communications Lab (EE Only)	ELC373	ELC341	ELC361	yes	no	0.5	For Electrical Students Only.
Operating Systems (CompE Only)	CSC345	MAT127, CSC230, CSC270, AND ELC451 (>=C for all)		no	yes	1.0	For Computer Students Only.
Systems Engineering + Engineering Economy (New Course)	ENG348	ENG212 OR ENG222 (Jr/Sr Only)		yes	yes	1.0	
Technical Elective: ECE Discipline or Engineering (by advisement)	TechE	At least ELC251 AND ELC321		yes	yes	1.0	
Fall Senior Year	Course Units:	EE=4.5, CompE=4.5		Req for Electrical?	Req for Computer?	CU	
Senior Professional Seminar	ENG099			yes	yes	0.0	
Senior Project I	ELC495	ENG348, ENG352, AND ELC411		yes	yes	0.5	
Digital Signal Processing	ELC423	ENG312 AND ELC321		yes	yes	1.0	
Signal Processing Lab	ELC433		ELC423	yes	yes	0.5	
Control Systems Laboratory	ENG354		ENG352	yes	yes	0.5	
Society, Ethics and Technology	IDS252			yes	yes	1.0	
Technical Elective: ECE Discipline or Engineering (by advisement)	TechE	At least ELC251 AND ELC321		yes	yes	1.0	
Spring Senior Year	Course Units:	EE=4.5, CompE=5.0		Req for Electrical?	Req for Computer?	CU	
Senior Project II	ELC496	ELC495		yes	yes	0.5	

Electronics II (EE Only)	ELC383	ELC251		yes	no	1.0	**For Electrical Students Only.**
Software Engineering (CompE Only)	CSC415	CSC230, CSC270, AND MAT127 (>=C for all)		no	yes	1.0	**For Computer Students Only.**
Computer Engineering Laboratory II (CompE Only)	ELC463	ELC363		no	yes	0.5	**For Computer Students Only.**
Technical Elective: ECE Discipline or Engineering (by advisement)	TechE	At least ELC251 AND ELC321		yes	yes	1.0	
College Core Elective (by advisement)	LL			yes	yes	1.0	
College Core Elective (by advisement)	LL			yes	yes	1.0	
					Total CU	36.0	

Note on Technical Electives – Students must take a total of four technical electives from the list below. Two categories exist: 1) ECE discipline electives and 2) engineering electives. Students may fulfill the technical elective requirement by taking: 1) four ECE discipline electives, 2) three ECE discipline electives and one engineering elective, or 3) two ECE discipline electives and two engineering electives. See the list below:

ECE-Specific Technical Elective Listing (between 2 and 4)
- ELC477: Power Systems and Renewability (with link)
- ELC435: Artificial Neural Networks (with link)
- ELC431: RF/Microwave Engineering (with link)
- ELC470: Semiconductor Devices (with link)
- ELC441: Digital Engineering Systems (with link)
- ELC453: Digital Control Systems
- ELC471: VLSI Design (with link)
- ELC475: Advanced Digital Signal Processing
- ELC480: Digital Video Processing and Compression (with link)
- ELC470: Cybersecurity
- ELC470: Advanced Sensor Networks
- ELC470: Other Special Topics (by advisement only)

The following course(s) are allowed for computer engineering students only.
- ELC341: Communication Systems
- ELC383: Electronics II

General Engineering Elective Listing (2 maximum)
- ENG470: Sustainability Europe
- ENG152: Engineering Materials Science

- ENG222: Statics
- ENG262: Dynamics
- ENG322: Thermodynamics
- CSC300/400 Level Courses: Ask your advisor.

Note on Mathematics Elective – Students must take one of the following, separate from the technical elective requirement:
- ENG342: Advanced Engineering Mathematics II
- STA215: Statistical Inference and Probability

Note on Credit Limit - To improve retention in the School of Engineering, students with fewer than 22.5 completed course units that achieve a cumulative GPA of 2.75 or less are limited to 4.5 course units per semester. This limit may be lower for students on the retention list or academic probation.
- 5.5 Course Units - for all ECE first semester students and seniors.
- 5.5 Course Units - for ECE freshmen/sophomore/juniors with cumulative GPA >= 2.75. Otherwise…
- 4.5 Course Units - for ECE freshmen/sophomores/juniors with cumulative GPA < 2.75. Those on the retention list are limited to only 3.0 course units/semester.

Note on Program Entrance, Retention, and Exit Standards – Every major program at the College has set standards for allowing students to remain in that program, to transfer within the College from one program to another, and to graduate from a program. The following are the standards for engineering majors. Minimum grades are noted in parentheses.

- Retention in the engineering programs is based on the following performance standards in these "critical content courses": **PHY 201 (>= C); MAT 127 (>= C), MAT 128 (>= C).** A student who does not achieve these minimum performance standards, earns a grade of F, and/or has a cumulative GPA of less than 2.0 will be placed on the Engineering Programs Retention List. Placement on the Retention List for two consecutive semesters or three non-consecutive semesters will result in dismissal from the major. Students dismissed from the major may appeal for re-entry into the major.
- Students on academic probation are limited to 3.0 course units per semester.
- Entrance (internal transfer) into the engineering programs from another program within the College is based upon the following performance standards in these "foundation courses": PHY 201 (>= C); MAT 127 (>= C), MAT 128 (>= C). Internal transfer within engineering programs will be considered if enrollment limits are not exceeded.
- Graduation requires an in-major cumulative GPA of 2.0

Note on Freshmen Math Placement – Freshmen will be placed into the most advanced math class for which they meet the requirements, as outlined below [ref].
- MAT128: Calculus II and Beyond
  - Refer to the AP Legend [ref]

- o MAT127: Calculus I
  - o SAT Math ≥ 630
  - o ACT Math ≥ 28
  - o TCNJ Calculus Readiness Exam ≥ 15
- o MAT120: Precalculus
  - o SAT Math ≥ 550
  - o ACT Math ≥ 24
  - o TCNJ Calculus Readiness Exam ≥ 11
  - o TCNJ Algebra Readiness Exam ≥ 15
- o MAT095: Algebra
  - o SAT Math < 550
  - o ACT Math < 24
  - o TCNJ Calculus Readiness Exam < 11
  - o TCNJ Algebra Readiness Exam < 15

Note on Advanced Placement (AP) – Students may be awarded for a number of courses including Calculus, Physics, Chemistry, etc. For further details on AP placement click this link (https://bit.ly/2t7ixPF).

Note on Transfers Students - Transfer students entering the program with at least 7.5 course units are not required to take an FYS course nor fulfill the civic responsibilities component of liberal learning. They still are, however, required to meet the domain requirements outlined in **Error! Reference source not found.**. Transfer students may or may not be required to take ENG144/ELC145, depending on what previous courses they have taken.

Computer Requirements – Students should have full-time access to a computer that meets or exceeds the following specifications:
- o Form – Laptop computers are recommended, although desktops are acceptable.
- o Operating System – Windows 10/11 64-bit Home or Pro, not operating in the limited capability S-mode.
  - o Students are strongly discouraged from buying a non-Windows device. They are responsible for handling ALL compatibility problems associated with the use of AppleOS or LinuxOS computers. Students should NOT rely on machines like tablets, iPads, or Chromebooks as their main computing device.
- o Screen Size – Greater than 13.3 inches.
- o Video Card – NVIDIA GTX 3050 or better.
  - o Alternative brands with similar performance may be acceptable.
- o Processor – 12th Gen (or newer) Intel Core i7 (or higher). 5000 Series (or newer) AMD Ryzen 7 (or higher).
- o RAM – 16GB or more. 32GB recommended.
- o Hard Drive – 512GB or higher. 1TB+ recommended.
- o Release Year – All components within the system, including the processor, should have been released within the last two years, preceding the purchase. For example, a computer

purchased for use in fall 2023 cannot employ an Intel Processor released in April 2021. Any new machine purchased from a major retailer should meet this requirement.

Appendix: College Core ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- -----

Notes on College Core Electives – Students must take liberal learning electives to address both requirements below. Students may complete their liberal learning requirement (theoretically) in two courses, assuming they choose courses correctly. For example, one could choose a "Societal Change in Historical Perspective" course that addresses the gender and global civic responsibilities long with any a "Literary, Visual, and Performing Arts" course that addresses the race and ethnicity civic responsibility. That is, again, simply an example.

Be very careful with topics courses. Topics courses may satisfy College Core requirements, but you must check very carefully to be certain that the specific topic in which you wish to enroll satisfies a particular requirement, as different topics with the same course prefix and number may not satisfy the same College Core requirements (see this link for a very helpful example). Also make sure the course meets the domain and civic responsibilities you need. A single course can satisfy up to one domain and up to two civic responsibilities. Some courses satisfy a domain but no civic responsibilities, and others satisfy civic responsibilities but no domain. Additional information is available through the websites below.
  o https://collegecore.tcnj.edu/approved-courses-for-college-core/
  o https://collegecore.tcnj.edu/choosing-liberal-learning-courses/
  o https://engineering.tcnj.edu/resources/liberal-learning/