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

Electrical and Computer Engineering Curricula
Bachelor of Science in Electrical Engineering (02/2023 Update)
Bachelor of Science in Computer Engineering (02/2023 Update)
Learn More About ECE: https://bit.ly/ECEatTCNJvideo

Proposed Curricula (Effective for Class of 2025)
Attention Current and 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 Spring 2024

Course Name	Course Number	Prereqs	Coreqs	Elect	Comp	CU
Fall Freshman Year	Course Units:	EE=4.0, CompE=4.0				
Introduction to Engineering	ENG095			X	X	0.0
Fundamentals of Engineering Design (aka. Freshman Design Course)	ENG144			X	X	1.0
Calculus A	MAT127	see note below		X	X	1.0
General Physics I	PHY201		MAT125 or MAT127	X	X	1.0
First-Year Writing (if not exempted)*	FYW102			X	X	0.0
Creative Design	TST161			X	X	1.0
Spring Freshman Year	Course Units:	EE=4.0, CompE=4.0		Elect	Comp	CU
Calculus B	MAT128	MAT127		X	X	1.0
General Physics II	PHY202	PHY201 AND MAT 127		X	X	1.0
Computer Science I	CSC220			X	X	1.0
ECE-Specific Freshman Design Section	ELC145		ENG144	X	X	0.0
First Year Seminar*	FYS16X			X	X	1.0
Fall Sophomore Year	Course Units:	EE=4.0, CompE=4.0		Elect	Comp	CU
Circuits Analysis	ENG212	PHY202 (>=C-)		X	X	1.0

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Adv. Engineering Mathematics I	ENG272	MAT128		X	X	1.0	
Digital Circuits and Microprocessors	ENG312		CSC220	X	X	1.0	
Computer Science II (CompE Only)	CSC230	CSC220 (>=C)		no	X	1.0	For Computer Students Only.
Modern Physics (EE Only)	PHY321	MAT127 AND PHY202		X	no	1.0	For Electrical Students Only.
Spring Sophomore Year	Course Units:	EE=4.5, CompE=5.5		Elect	Comp	CU	
Electronics	ELC251	ENG212 AND ENG272		X	X	1.0	
Circuits Analysis Laboratory	ENG214		ENG212	X	X	0.5	
Systems and Signals	ELC321	ENG272	ENG212	X	X	1.0	
Discrete Structures (CompE Only)	CSC270	CSC220 (>=C) OR CSC230 (>=C) AND MAT127 (>=C)		no	X	1.0	For Computer Students Only.
Multivariable Calculus	MAT229	MAT128		X	X	1.0	
Principles of Microeconomics	ECO101	MAT095 OR MAT096		X	X	1.0	
Fall Junior Year	Course Units:	EE=5.5, CompE=4.5		Elect	Comp	CU	
Engineering Seminar III	ENG093			X	X	0.0	
Communication Systems (EE Only)	ELC341	ELC251 AND ELC321		X	no	1.0	For Electrical Students Only.
Embedded Systems with Lab	ELC411	ELC251 AND ELC312		X	X	1.0	
Electronics Lab	ELC333			X	X	0.5	
Computer Architecture and Org.	ELC451	ENG312	ENG312	X	X	1.0	
Mathematics Elective*	ENG342 or STA215	varies		X	X	1.0	
Technical Elective: ECE Discipline or Engineering (by advisement)	TechE	ELC251		X	X	1.0	
Spring Junior Year	Course Units:	EE=5.0, CompE=4.5		Elect	Comp	CU	
Engineering Seminar IV	ENG094			X	X	0.0	
Control Systems	ENG352	ENG212 AND ENG272		X	X	1.0	

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Computer Engineering Laboratory I	ELC363		ELC451	X	X	0.5	
Engineering Electromagnetics (EE Only)	ELC361	MAT229, ENG212, AND ENG272		X	no	1.0	For Electrical Students Only.
Wireless and Communications Lab (EE Only)	ELC373	ELC341	ELC361	X	no	0.5	For Electrical Students Only.
Software Engineering (CompE Only)	CSC415	CSC220 (>=C)		no	X	1.0	For Computer Students Only.
Systems Engineering + Engineering Economy (New Course)	ENG348	ENG212 OR ENG222		X	X	1.0	
Technical Elective: ECE Discipline or Engineering (by advisement)	TechE	At least ELC251 AND ELC321		X	X	1.0	
Fall Senior Year	Course Units:	EE=4.5, CompE=4.5		Elect	Comp	CU	
Senior Professional Seminar	ENG099			X	X	0.0	
Senior Project I	ELC495	ENG348, ENG352, AND ELC411		X	X	0.5	
Digital Signal Processing	ELC423	ENG312 AND ELC321		X	X	1.0	
Signal Processing Lab	ELC433		ELC423	X	X	0.5	
Control Systems Laboratory	ENG354		ENG352	X	X	0.5	
Society, Ethics and Technology	IDS252			X	X	1.0	
Technical Elective: ECE Discipline or Engineering (by advisement)	TechE	At least ELC251 AND ELC321		X	X	1.0	
Spring Senior Year	Course Units:	EE=4.5, CompE=5.0		Elect	Comp	CU	
Senior Project II	ELC496	ELC495		X	X	0.5	
Electronics II (EE Only)	ELC383	ELC251		X	no	1.0	For Electrical Students Only.
Operating Systems (CompE Only)	CSC345	MAT127, CSC230, ELC451, AND CSC270 (>=C)		no	X	1.0	For Computer Students Only.
Computer Engineering Laboratory II (CompE Only)	ELC463	ELC363		no	X	0.5	For Computer Students Only.

Technical Elective: ECE Discipline or Engineering (by advisement)	TechE	At least ELC251 AND ELC321		X	X	1.0
Liberal Learning Elective (by advisement)	LL			X	X	1.0
Liberal Learning Elective (by advisement)	LL			X	X	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
- ELC435: Artificial Neural Networks
- ELC431: RF/Microwave Engineering
- ELC441: Digital Engineering Systems
- ELC453: Digital Control Systems
- ELC471: VLSI Design
- ELC475: Advanced Digital Signal Processing
- ELC480: Digital Video Processing and Compression
- ELC470: Cybersecurity
- ELC470: Advanced Sensor Networks
- ELC470: Advanced Semiconductor Materials
- ELC470: Other Special Topics (by advisement only)

The following course(s) are allowed for computer engineering students only.

- ELC383: Electronics II (computer engineering only)

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.

Notes 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

Notes on Liberal Learning 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.

Table 2: Overview of Liberal Learning Requirements for ECE Students

RowID	Liberal Learning Domains	Course	Does Course To Left Address Civic Responsibility?
1	Literary, Visual, and Performing Arts	TST161	No
2	World Views and Ways of Knowing	IDS252	No
3	Behavioral, Social, or Cultural Perspectives	ECO101	No
4	Natural Science (with a Lab)	CHE201	No
5	Quantitative Reasoning	MAT127	No
6	Natural Science or Quantitative Reasoning	PHY201	No
7	Social Change in Historical Perspective	You Choose…	These two courses together must address the three following civic responsibilities: 1) gender, 2) global, and 3) race and ethnicity.
8	You must take one course from following domains: 1) Literary, Visual and Performing Arts, 2) World Views and Ways of Knowing, 3) Behavioral, Social or Cultural Perspectives, or 4) Social Change in Historical Perspectives.	You Choose…	

Be very careful with topics courses. Topics courses may satisfy Liberal Learning 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 Liberal Learning 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.

- https://liberallearning.tcnj.edu/approved-courses-for-liberal-learning/
- https://liberallearning.tcnj.edu/choosing-liberal-learning-courses/
- https://engineering.tcnj.edu/resources/liberal-learning/

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 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 Table 2. Transfer students may or may not be required to take ENG144/ELC145, depending on what previous courses they have taken.

Suggested Computer Specifications – Faculty recommend that students should have full-time access to a computer that meets or exceeds the following specifications:

- Form – Laptop computers are recommended, although desktops are acceptable.
- 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.

- Operating System – Windows 10/11 64-bit Home or Pro, not operating in the limited capability S-mode.
    - 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.
- Screen Size – Greater than 13.3 inches.
- Video Card – NVIDIA RTX 3050 or better.
    - Alternative brands with similar performance may be acceptable.
- Processor – Intel Core i7 or higher. AMD Ryzen 7 or higher.
- RAM – 16GB or more. 32GB recommended.
- Hard Drive – 512GB or higher. 1TB+ recommended.