

**COMPUTER ENGINEERING PROGRAM: FIRST AND SECOND YEARS
EARLY-STARTING STUDENTS**

	SEMESTER I	SEMESTER II	SEMESTER III	SEMESTER IV
MATHEMATICS	MATH UN1101 (3)	MATH UN1102 (3)	APMA E2000 (4) and E2001 (0) either semester	
				APMA E2101 (3) ¹
PHYSICS (three tracks, choose one)	UN1401 (3) ————— UN1402 (3) ————— UN1601 (3.5) ————— UN1602 (3.5) ————— UN2801 (4.5) ————— UN2802 (4.5) —————		▶ Lab UN1494 (3) or chem. lab UN1500 (3) ▶ Lab UN1494 (3) or chem. lab UN1500 (3) ▶ Lab UN3081 (2) or chem. lab UN1500 (3)	
CHEMISTRY	one-semester lecture (3–4) UN1403 or UN1404 or UN2045 or UN1604 Lab UN1500 (3) either semester or physics lab UN1494 (3)			
CORE REQUIRED COURSES	ELEN E1201 (3.5) Intro. to elec. eng. (either semester)		ELEN E3801 (3.5) Signals and systems	COMS W3134 (3) or W3137 (4) Data structures CSEE W3827 (3) Fund. of computer sys.
REQUIRED LABS			ELEN E3084 (1) Signals and systems lab	ELEN E3082 (1) Digital systems lab
UNIVERSITY WRITING	CC1010 (3) either semester			
REQUIRED NONTECHNICAL ELECTIVES²			HUMA CC1001, COCI CC1101, or Global Core (3–4) HUMA UN1121 or UN1123 (3)	HUMA CC1002, COCI CC1102, or Global Core (3–4) ECON UN1105 (4) and UN1155 recitation (0)
COMPUTER SCIENCE	ENGI E1006 (3)	COMS W1004 (3) or W1007 (3)	COMS W3203 (3) Discrete math.	
PHYSICAL EDUCATION	UN1001 (1)	UN1002 (1)		
THE ART OF ENGINEERING	ENGI E1102 (4) either semester			

¹APMA E2101 may be replaced by MATH UN2030 (formerly MATH E1210) and either APMA E3101, or MATH UN2010, or COMS W3251.

² Some of these courses can be postponed to the junior or senior year to make room for taking the required core computer engineering courses.

COMPUTER ENGINEERING: THIRD AND FOURTH YEARS EARLY-STARTING STUDENTS

		SEMESTER V	SEMESTER VI	SEMESTER VII	SEMESTER VIII
CORE REQUIRED COURSES		IEOR E3658 (3) ¹ Probability	ELEN E3331 (3) Electronic circuits	COMS W4118 (3) Operating systems or COMS W4115 (3) Programming lang.	
		COMS W3157 (4) Advanced programming	COMS W3261 (3) Computer sci. theory	(Choose 3 of 6) CSEE W4119 (3) Computer networks, EECS E4321 (3) Digital VLSI circuits, CSEE W4823 (3) Advanced logic design, CSEE W4824 (3) Computer architecture, CSEE W4840 (3) Embedded systems, CSEE W4868 (3) System-on-chip platforms	
REQUIRED LABS		ELEN E3081 (1) Circuit analysis lab	ELEN E3083 (1) Electronic circuits lab		
ELECTIVES	TECH²	15 points required; see details within the text			
	NONTECH	Complete 27-point requirement; see page 9 (27-Point Nontechnical Requirement)			
TOTAL POINTS³		17.5	17	15	15

For a discussion about programming languages used in the program, please see compeng.columbia.edu.

¹ SIEO W3600, STAT GU4203, and STAT GU4001 can be used instead of IEOR E3658, but W3600 and GU4001 may not provide enough probability background for elective courses such as ELEN E3701. Students completing an economics minor who want such a background can take IEOR E3658 and augment it with IEOR E4307.

² The total points of technical electives is reduced to 12 if APMA E2101 has been replaced by MATH UN2030 (formerly MATH E1210) and either APMA E3101 or MATH UN2010, or COMS W3251. Combined-plan students with good grades in separate, advanced courses in linear algebra and ODEs can apply for this waiver, but the courses must have been at an advanced level for this to be considered.

³ "Total points" assumes that 20 points of nontechnical electives and other courses are included.

**COMPUTER ENGINEERING PROGRAM: FIRST AND SECOND YEARS
LATE-STARTING STUDENTS**

	SEMESTER I	SEMESTER II	SEMESTER III	SEMESTER IV
MATHEMATICS	MATH UN1101 (3)	MATH UN1102 (3)	APMA E2000 (4) and E2001 (0) either semester	
				APMA E2101 (3) ¹
PHYSICS (three tracks, choose one)	UN1401 (3)	UN1402 (3)	→ Lab UN1494 (3) or chem. lab UN1500 (3)	
	UN1601 (3.5)	UN1602 (3.5)	→ Lab UN1494 (3) or chem. lab UN1500 (3)	
	UN2801 (4.5)	UN2802 (4.5)	→ Lab UN3081 (2) or chem. lab UN1500 (3)	
CHEMISTRY	one-semester lecture (3–4) UN1403 or UN1404 or UN2045 or UN1604 Lab UN1500 (3) either semester or physics lab UN1494 (3)			
CORE REQUIRED COURSES	ELEN E1201 (3.5) ² Intro. to elec. eng. (either semester)			
UNIVERSITY WRITING	CC1010 (3) either semester			
REQUIRED NONTECHNICAL ELECTIVES			HUMA CC1001, COCI CC1101, or Global Core (3–4) HUMA UN1121 or UN1123 (3)	HUMA CC1002, COCI CC1102, or Global Core (3–4) ECON UN1105 (4) and UN1155 recitation (0)
COMPUTER SCIENCE	ENGI E1006 (3)	COMS W1004 (3) or W1007 (3)	W3203 (3) Discrete math.	
PHYSICAL EDUCATION	UN1001 (1)	UN1002 (1)		
THE ART OF ENGINEERING	ENGI E1102 (4) either semester			

¹ APMA E2101 may be replaced by MATH UN2030 (formerly MATH E1210) and either APMA E3101, or MATH UN2010, or COMS W3251.

² Transfer and combined-plan students are expected to have completed the equivalent of the first- and second-year program listed above before starting their junior year. Note that this includes some background in discrete math (see COMS W3203) and electronic circuits (see ELEN E1201). Transfer and combined-plan students are also expected to be familiar with Java before they start their junior year. If students must take the one-point Java course (COMS W3101-03) junior year, prerequisite constraints make it difficult to complete the remaining computer engineering program by the end of the senior year.

**COMPUTER ENGINEERING: THIRD AND FOURTH YEARS
LATE-STARTING STUDENTS**

		SEMESTER V	SEMESTER VI	SEMESTER VII	SEMESTER VIII
CORE REQUIRED COURSES		IEOR E3658 (3) ¹ Probability	COMS W3157 (4) Advanced programming	COMS W4118 (3) Operating systems or COMS W4115 (3) Programming lang.	
		COMS W3134 (3) or W3137 (4) Data structures	ELEN E3331 (3) Electronic circuits	(Choose 3 of 6) CSEE W4119 (3) Computer networks, EECS E4321 (3) Digital VLSI circuits, CSEE W4823 (3) Advanced logic design, CSEE W4824 (3) Computer architecture, CSEE W4840 (3) Embedded systems, CSEE W4868 (3) System-on-chip platforms	
	ELEN E3201 (3.5) Circuit analysis	COMS W3261 (3) ² Models of comp.			
	ELEN E3801 (3.5) Signals and systems	CSEE W3827 (3) Fund. of computer systems			
REQUIRED LABS		ELEN E3081 (1) ³ Circuit analysis lab	ELEN E3083 (1) ³ Electronic circuits lab		
		ELEN E3084 (1) ³ Signals and systems lab	ELEN E3082 (1) ³ Digital systems lab		
ELECTIVES	TECH⁴	15 points required; see details within the text			
	NONTECH	Complete 27-point requirement; see page 9 (27-Point Nontechnical Requirement)			
TOTAL POINTS⁵		15	18	15	18

For a discussion about programming languages used in the program, please see compeng.columbia.edu.

¹ SIEO W3600, STAT GU4203, and STAT GU4001 can be used instead of IEOE E3658, but W3600 and GU4001 may not provide enough probability background for elective courses such as ELEN E3701. Students completing an economics minor who want such a background can take IEOE E3658 and augment it with IEOE E4307.

² COMS W3261 can be taken one semester later than pictured.

³ If possible, ELEN E3081 and ELEN E3084 should be taken along with ELEN E3201 and ELEN 3801, respectively, and ELEN E3083 and ELEN E3082 taken with ELEN E3331 and CSEE W3827 respectively.

⁴ The total points of technical electives is reduced to 12 if APMA E2101 has been replaced by MATH UN2030 (formerly MATH E1210) and either APMA E3101 or MATH UN2010, or COMS W3251. Combined-plan students with good grades in separate, advanced courses in linear algebra and ODEs can apply for this waiver, but the courses must have been at an advanced level for this to be considered.

⁵ Assuming technical electives taken Semesters VII and VIII, and 9 points of nontechnical electives taken Semesters VI, VII, and VIII.