## ELECTRICAL ENGINEERING PROGRAM: FIRST AND SECOND YEARS

| | TERM I | TERM II | TERM III | TERM IV |
|---|---|---|---|---|
| MATHEMATICS (two tracks, choose one) | Calc. IA (3) → / Calc. IS (4) → | Calc. IIA (3) → / Calc. IIS (4) → | Calc. IIIA (3) → / Calc. IIIS (3) → | Calc. IVA (3) → ODE (3) → / ODE (3) → |
| PHYSICS (three tracks, choose one) | C1401 (3) → C1601 (3.5) → C2801 (4.5) → | C1402 (3) → C1602 (3.5) → C2802 (4.5) → | C1403 (3) → C2601 (3.5) → Lab W3081 (1.5) → | Lab C1494 (3)* → Lab C2699 (3) → |
| CHEMISTRY | one-term lecture (3–4) C1403 or C1404 or C3045 or C2407 → | | | |
| ELECTRICAL ENGINEERING | | E1201 (3.5)† → | | |
| ENGLISH COMPOSITION (four tracks, choose one) | C1007 (3) → / C1004 (3) → / Z1003 (4) → / ALP0006 (6) → | C1007 (3) → / Z1003 (4) → | | |
| REQUIRED NON-TECHNICAL ELECTIVES | | | HUMA C1001, C1101, or V2001 (4) HUMA C1121 or C1123 (3) → | HUMA C1002, C1102, or V2002 (4) ECON W1105 (4)+ W1155 recitation (0) → |
| REQUIRED TECH ELECTIVES | (3) (student's choice) see list of first- and second-year technical electives (page 14) → | | | |
| COMPUTER SCIENCE | CS W1007 (3) either semester‡ → | | | |
| PHYSICAL EDUCATION | C1001 (1) → | C1002 (1) → | | |
| GATEWAY LAB | ENGI E1102 (3) either semester → | | | |

*Chemistry Lab (*Chemistry C1500*) may be substituted for Physics Lab, although this is not generally recommended.
†Transfer students and 3-2 Combined Plan students who have not taken *ELEN E1201* prior to the junior year are expected to have roughly equivalent course work or experience when they start *ELEN E3201*.
‡*COMS W1003* may be substituted for *COMS W1007*.

tion, respectively. The culmination of the laboratory sequence and the design experiences introduced throughout earlier courses is a senior design experience course (Group B), which includes a significant design project that ties together the core program, encourages creativity, explores practical aspects of engineering practice, and provides additional experience with communication skills in an engineering context. Finally, four technical electives are required, allowing a small amount of specialization and further practice with engineering principles, engineering design, and tools, applied in areas of particular interest.

There is a strong interaction between the Department of Electrical Engineering and the Departments of Computer Science, Applied Physics and Applied Mathematics, Industrial Engineering and Operations Research, Physics, and Chemistry. Students are encouraged to choose electives from other departments as well as from Electrical Engineering.

The program in electrical engineering leading to the B.S. degree is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Before the junior year, students at Columbia are encouraged to take some courses sooner than indicated here. The most likely possibilities, depending on background, are *ELEN E3910, ELEN E3201* (followed by *ELEN E3301*), and Group A courses. The sample third- and fourth-year schedule listed on the following page is a condensed two-year plan.

## GRADUATE PROGRAMS

The Department of Electrical Engineering offers graduate programs leading to the degree of Master of Science (M.S.), the graduate professional degree of Electrical Engineer (E.E.), and the degrees of Doctor of Engineering

## ELECTRICAL ENGINEERING: THIRD AND FOURTH YEARS

| | | TERM V | TERM VI | TERM VII | TERM VIII |
|---|---|---|---|---|---|
| CORE REQUIRED COURSES | | ELEN E3106 (3.5) Solid state<br>ELEN E3201 (3.5) Circuit analysis<br>ELEN E3910 (3)* Digital systems | ELEN E3202 (3.5) Signals & systems I<br>ELEN E3301 (3.5) Electronic circuits<br>ELEN E3401 (4) Electromagnetics | ELEN E3203 (3) Signals & systems II | |
| REQUIRED COURSES | LABS | E3041 (2) ELEN lab I | E3042 (2) ELEN lab II | E3043 (2) ELEN lab III | One Group B Course ELEN E3044, E3940, E3998, E4332, or E4340 |
| | GROUP A | All Required: APMA E3101, IEOR W3658 or W4105, MSAE E3111, and COMS W3131 or W3139 (Most of these courses are *not* offered both semesters.) | | | |
| ELECTIVES | TECHNICAL (GROUP C) | 12 points required:<br>•2 courses from Electrical Engineering<br>•Fulfill ABET requirement (see worksheet from EE office)<br>•Approved by adviser | General Eligibility Guidelines:<br>•All 3000 and 4000 level ELEN (except E3000)<br>•Most 3000 and 4000 level from other SEAS departments<br>•Cannot fulfill or significantly overlap other ELEN requirements<br>•No courses below 3000 level except one of the "Professional-Level Courses for First- and Second-Year Students" other than ELEN E1201 | | |
| | NONTECHNICAL | 27 points required over the course of four years | | | |
| TOTAL POINTS: | | 16 | 15 | 18 | 16 |

* *COMS W3823* may be substituted for *ELEN E3910,* but *COMS W3824* must then be a technical elective.

Science (Eng.Sc.D.) and Doctor of Philosophy (Ph.D.). The Graduate Record Examination (General Test only) is required of all applicants except special students. An undergraduate grade point average equivalent to B or better from an institution comparable to Columbia is expected.

Applicants who, for good reasons, are unable to submit GRE test results by the deadline date but whose undergraduate record is clearly superior may file an application without the GRE scores. An explanatory note should be added to ensure that the application will be processed even while incomplete. If the candidate's admissibility is clear, the decision may be made without the GRE scores; otherwise, it may be deferred until the scores are received.

There are no prescribed course requirements in any of the regular graduate degree programs. Students, in consultation with their faculty advisers, design their own programs, focusing on particular fields of electrical engineering. Among the fields of graduate study are microelectronics, communications and signal processing, integrated circuit and system analysis and synthesis, photonics, electromagnetic theory and applications, plasma physics, and quantum electronics.

Candidates for the M.S. degree must complete 30 points of credit beyond the bachelor's degree. A minimum of 15 points of credit must be at the 6000 level or higher. No credit will be allowed for undergraduate courses (3000 or lower). At least 15 points must be taken in courses designated ELEN or COMS, of which at least 10 points must be in the ELEN designation. Courses to be credited toward the M.S. degree can be taken only upon prior approval of a faculty adviser in the Department of Electrical Engineering. This applies to the summer session as well as the autumn and spring terms. Certain 4000-level courses will not be credited toward the M.S. degree, and no more than 6 points of research may be taken for credit. Up to 3 points of credit for approved graduate courses outside of engineering and science may be allowed.