APPLIED MATHEMATICS PROGRAM: FIRST AND SECOND YEARS

	SEMESTER I	SEMESTER II	SEMESTER III	SEMESTER IV
MATHEMATICS[1]	MATH UN1101 (3)	MATH UN1102 (3)	APMA E2000 (4) and E2001 (0) either semester	**and** ODE (3)[2]
PHYSICS (three tracks, choose one)	UN1401 (3) — UN1402 (3) — UN1403 (3)[3] → Lab UN1494 (3)[4] UN1601 (3.5) — UN1602 (3.5) — UN2601 (3.5) UN2801 (4.5) — UN2802 (4.5) → Lab UN3081 (2)[4]			
CHEMISTRY/ BIOLOGY (choose one course)	CHEM UN1403 (3), or higher **or** BIOL UN2001 (4) **or** BIOL UN2005 (4), or higher			
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)
REQUIRED TECH ELECTIVES	(3) Student's choice			
COMPUTER SCIENCE	ENGI E1006 (3) any semester			
PHYSICAL EDUCATION	UN1001 (1)	UN1002 (1)		
THE ART OF ENGINEERING	E1102 (4) either semester			

[1] Students with advanced standing may start the calculus sequence at a higher level (see page 12 for placement), in which case students are suggested to add linear algebra in the first two years.

[2] Applied mathematics majors should satisfy their ODE requirement with the Mathematics Department (ordinarily MATH UN2030). Students who take APMA E2101 prior to declaring their major in applied mathematics may use this course to satisfy their ODE requirement with the permission of the faculty adviser.

[3] Transfer students who have not fulfilled the physics requirement prior to enrolling at Columbia may substitute this course with PHYS BC3001.

[4] Or a lab course in Astronomy, Astrophysics, Biology, or Chemistry.

APPLIED MATHEMATICS: THIRD AND FOURTH YEARS

		SEMESTER V	SEMESTER VI	SEMESTER VII	SEMESTER VIII
REQUIRED COURSES		APMA E3101 (3)[1] Linear algebra (Applied math, I) APMA E4204 (3)[1] Complex variables APMA E4300 (3) Introduction to numerical methods (Computational math, I) APMA E4901 (0) Seminar	APMA E3102 (3)[1] Partial differential equations (Applied math, II) APMA E4101 (3) Introduction to dynamical systems (Applied math, III) Course from Group A[2]	MATH GU4061 (3)[1] Modern analysis APMA E4903 (3 or 4) Seminar Course from Group B[2]	APMA E3900 (3)[3] Research Courses designated MATH, APMA, or STAT (3)
ELECTIVES	**TECH**[4]	3 points	3 points	3 points	6 points
	NONTECH	3 points	3 points	3 points	3 points
TOTAL POINTS		15	15	16	15

[1] MATH UN2010 or COMS W3561 may be substituted for APMA E3101; MATH UN3028 may be substituted for APMA E3102; MATH UN3007 may be substituted for APMA E4204; MATH UN2500 may be substituted for MATH GU4061.

[2] One course from Group A (Probability) and one course from Group B (Applied Probability/Statistics) required for graduation. Group A: IEOR E3658: Probability for engineers or IEOR E4150: Introduction to probability and statistics; STAT GU4203: Probability theory; MATH W4155: Probability theory. Group B: IEOR E3106: Stochastic systems and applications; IEOR E4106: Stochastic models; STAT GU4204: Statistical inference; STAT GU4207: Elementary stochastic processes; COMS W4771: Machine learning.

[3] With an adviser's permission, an approved technical elective may be substituted.

[4] Any course in science, math, or engineering at the 3000 level or above qualifies as a technical elective, except for required or elective courses in the minor in entrepreneurship and innovation which do not count as technical electives unless authorized by an adviser. Elective courses may be chosen from other departments in SEAS and Arts and Sciences, e.g., the Departments of Mechanical Engineering, Electrical Engineering, Mathematics, and Statistics.