

Math Majors in William & Mary

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July 6, 2020



WILLIAM & MARY

CHARTERED 1693

Why major in math?

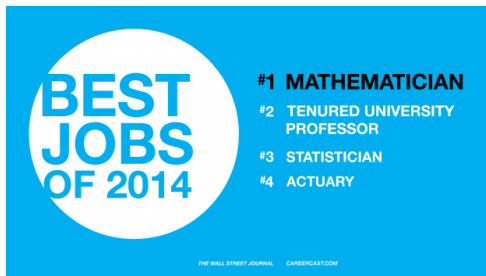


Figure 1: Average Projected Salaries by Discipline – Bachelor's Degrees

Broad Category	2015 Average Salary
Engineering	\$62,998
Computer Science	\$61,287
Math & Sciences	\$56,171
Business	\$51,508
Agriculture & Natural Resources	\$51,220
Healthcare	\$50,839
Communications	\$49,395
Social Sciences	\$49,047
Humanities	\$45,042

Source: *Salary Survey January 2015*, National Association of Colleges and Employers

Number of Math Majors in the Rise

Number of Math Majors in William & Mary 2008-2019

	2008	2009	2010	2011	2012	2013
Math	36	37	35	34	51	42
Grad School	31	30	24	27	26	22

	2014	2015	2016	2017	2018	2019
Math	45	58	65	70	56	70
CAMS			5	16	19	23
Total			70	86	75	93
Grad School	30	32	40	40	32	36

CAMS=Computational & Applied Mathematics & Statistics, since 2016
Data from National Student Clearinghouse, 2019

Job Placements

- ▶ Accounting/Consulting firms: Deloitte, Ernest-Young, etc.
- ▶ Financial/banking firms: Capital One, Wall Street, etc.
- ▶ Federal/State Government: FTC, DoD, FBI
- ▶ IT companies: Google, Facebook, Microsoft, IBM
- ▶ Military: Navy Research Center,
- ▶ Secondary Teaching: high schools, middle schools in Virginia

Grad School

- ▶ Math: UC Berkeley, Dartmouth, Duke, Rice, U Mich, U Va, U Md, U Az, UNC, UIC
- ▶ Stat, Data Sci, OR: MIT, UC Berkeley, Yale, U Chicago, Cornell, Columbia, Northwestern, NC St, Lehigh
- ▶ Physics, Economics: Harvard, Yale, UC Berkeley, Cal Tech, U Mich, Duke, Georgetown
- ▶ Engineering, CS: Columbia, Harvard, U Va, Ga Tech, Va Tech, UIUC
- ▶ Med, Law: U Penn, UCLA, Stanford

W&M Math/CAMS Graduates in 2019

- ▶ Total 102: Standard(28) Applied(50) CAMS Math Bio(13) CAMS Appl Stat(11)
- ▶ Double major 42: CS(9), Econ(7), Phys(7), Psyc(4), Busi(3)
- ▶ Grad school: Doctoral(≥ 19), Master(≥ 20)
- ▶ Grad school: W&M(4), UCB(3), Duke(3), UVa(2), UMich(2). Other(1): Harvard, Yale, MIT, Stanford, Cambridge, Vanderbilt, U Chicago, Columbia, Va Tech, U South Carolina, U North Carolina, WVU, Rice, Tufts, U Ga, Boston U, U Rochester, Drexel.
- ▶ Grad school areas: mathematics, (bio)statistics, computer science, data Science, operations research, theoretical physics, system biology, cell, biology, cognitive science, chemistry, bioengineering, nuclear engineering, industrial engineering, medicine, finance, education.
- ▶ Workforce: Federal Reserve Board of Governors, National Institutes of Health, Microsoft, Booz Allen Hamilton, Cambridge Associates, Genworth Financial, MicroStrategy, Northrop Grumman, Naval Surface Warfare Center, Automatic Data Processing, A.J. Dvoskin & Associates, Atlantic Bay Mortgage Group, Chesterfield County Public Schools.

W&M Math/CAMS Graduates in 2020

- ▶ Total 100: Standard(27) Applied(44) CAMS Math Bio(17) CAMS Appl Stat(8)
- ▶ Double major 63: CS(20), Econ(15), Psyc(4), Busi(4), Phil (3),
- ▶ Grad school: Doctoral(≥ 15), Master(≥ 29)
- ▶ Grad school: W&M(9), Columbia(3), CalTech(2), UCB(2), MIT(2), CMU(2), UVa(2), NWU(2), UCD(2). Other(1): Harvard, Yale, Stanford, Cornell, Duke, Oxford, PKU, UMich, UWash, NotreDame, UIUC, UTexas, UColorado, Cold Spring Harbor, Georgetown.
- ▶ Grad school areas: mathematics, (bio)statistics, computer science, data Science, business analytics, operations research, mathematics secondary education, atmospheric chemistry, applied physics, linguistics, genetics/plant biology/quantitative biology, biology, theoretical chemistry, biomedical engineering, biomedical informatics, industrial engineering, medicine, financial engineering, classics.
- ▶ Workforce: Jane Street, US Army, Google, CICC, Accenture, Mercer, Cornerstone Research, Virginia Public School System, Eldridge Industries, Aon, Deloitte, Booz Allen Hamilton, National Cancer Institute, MITRE, KPMG, CGI.

Math Majors in W&M

1. Standard Concentration
2. Applied Mathematics Concentration
 - 2.1 Computational Mathematics
 - 2.2 Operations Research
 - 2.3 Probability and Statistics
 - 2.4 Scientific Applications
3. Pre-College Mathematics Teaching Concentration
4. Computational and Applied Mathematics and Statistics, Applied Statistics Track
5. Computational and Applied Mathematics and Statistics, Mathematical Biology Track

The Computational and Applied Mathematics and Statistics (CAMS) program is an inter-disciplinary program drawing from the expertise of faculty in Applied Science, Biology, Economics, and Mathematics departments.

<http://www.wm.edu/as/mathematics/undergrad/major/index.php>

<http://www.wm.edu/as/cams/>

Common Requirements for Math Majors

Basic requirement:

- ▶ Core courses: Math 111/131, 112/132, 211, 212/213, 214
- ▶ Writing Requirement: Math 300 (1 credit), **or** Math 495-496 (6 credits)
- ▶ Computing Requirement: CS 141 (also CS 241 for Appl. Math)
- ▶ Math 307 (abstract algebra) and (**or** for Appl. Math) Math 311 (elementary analysis)

Course requirement:

- ▶ (Standard Math) **three** other three-credit 400 level mathematics courses and **two** other three-credit mathematics course at the 300-400 level, which cannot include both Math 351 and Math 451
- ▶ (Applied Math) at least **six** distinct three-credit courses at the 300-400 level with at least five being chosen from the four applied areas listed below and meeting the breadth and depth requirement
- ▶ Math 495-496 can substitute one 300-400 level course

<http://www.wm.edu/as/mathematics/undergrad/major/standard/rd-catalog-requirements/index.php>

<http://www.wm.edu/as/mathematics/undergrad/major/appliedmath/rd-catalog-requirements/index.php>

300-400 Math Courses

- ▶ Algebra in depth (MATH 307): elective courses chosen from MATH 405, 408, 412, 430, and 432
- ▶ Analysis in depth (MATH 311): elective courses chosen from MATH 403, 405, 416, and 428
- ▶ Operations Research/Actuarial Science in depth: elective courses chosen from MATH 323, 413, 424, and 432
- ▶ Differential Equations in depth: elective courses chosen from MATH 302, 345, 441, 442
- ▶ Computational Mathematics in depth: elective courses chosen from MATH 408, 413, 414, CS 426
- ▶ Probability and Statistics in depth: elective courses chosen from MATH 352, 451, 452, 459, ECON 408, CS 616, CS 680
- ▶ Scientific Applications in depth: elective courses chosen from MATH 302, 345, 405, 408, 441, 442, PHYS 301

Math major: **DO NOT** take MATH 106 or 351

What to take next?

After Math 211, 212/213, 214:

Math 302 (ODE), 307, 309 (intermediate linear algebra), 311, 316 (Euclidian and non-Euclidian geometry), 317 (differential geometry), 323 (OR), 332 (graph theory), 408 (advanced linear algebra), 412 (number theory), 413/414 (numerical analysis), 432 (combinatorics), 451 (probability)

After Math 307:

Math 430 (algebra II), and topic courses

After Math 311:

Math 403 (intermediate analysis), 405 (complex analysis), 426 (topology), 428 (functional analysis)

After Math 302:

Math 441 (ODE II), 442 (PDE)

After Math 451:

Math 352 (data analysis), 424 (OR stochastic), 452 (Mathematical Statistics),

CAMS major

The Computational and Applied Mathematics and Statistics (CAMS) program is an inter-disciplinary program drawing from the expertise of faculty in Applied Science, Biology, Economics, and Mathematics departments. In CAMS, applications are the primary driver of the research agenda for scholarly activity, with the objective to develop skills in mathematical modeling, data analysis, and computer simulation. Upon completion of the CAMS program, students will be well prepared for a career in mathematics, industry, and the sciences.

CAMS Applied Statistics Track:

Math: Math 111/131, 112/132, 211, 212/213, 214, 451, 452, (two of 352, 424, 459)

CS: CS 141, 241, (three of 301, 303, 421, 426 or 6**)

Econ: Econ 101, 102, 303, (three of 308, 380, 400, 407, 408, 415)

CAMS Mathematical Biology Track:

Math: Math 111/131, 112/132, 211, 212/213, 345(or Biol 325), APSC 351 (or APSC 456), (two of 351, 352, 451, 452, Biol 327)

CS: CS 141, 241, (one of 303, 426, 520, Phys 256)

Biol: any two BIOL 300 level or above courses

more Math: two of APSC 327, 450, Chem 341, 414, Math 302, 413, 414, 441, 442, Phys 403

William & Mary has a combined degree program with the engineering school at Columbia University. Under the 3:2 and 4:2 plans, a student spends three or four years at William & Mary and two years at the engineering school and receives a bachelor's degree from William & Mary in their primary major as well as a bachelor's degree in engineering from Columbia University.

Requirement:

- ▶ At least 3 years in W&M, completion of COLL classes (including COLL 400)
- ▶ Minimum overall GPA 3.30 and minimum pre-engineering GPA 3.30, a minimum grade of B (3.0) must be obtained on the first attempt in all science and mathematics prerequisite coursework.
- ▶ Courses in Mathematics, Physics, Chemistry, Computer Science, Economics, Writing.

http:

[//physics.wm.edu/~evmik/combined_plan/prerequisites.html](http://physics.wm.edu/~evmik/combined_plan/prerequisites.html)

Conclusion

- ▶ Be a Math major!

Conclusion

- ▶ **Be a Math major!**
- ▶ If you want to go to graduate school (PhD level) in Math, Phys, Engineering, Econ/Finance, then choose standard or applied math.
- ▶ If you want to go to graduate school (MS level) in Stat, Data Sci, Finance, then choose standard, applied math or CAMS applied stat.
- ▶ If you want to go to graduate school (PhD/MS level) in Life Sci, Med Sci, Marine Sci, then choose standard, applied math or CAMS math biol.
- ▶ If you will join work force after graduation, then choose any of standard, applied math or CAMS applied stat, CAMS math biol.
- ▶ Form: https://www.wm.edu/offices/registrar/documents/degree/declaration_of_major_form.pdf
- ▶ Instruction: http://www.wm.edu/as/undergraduate/advising/for_students/exploring-majors/majors/index.php
- ▶ I can help you with declaring standard, applied math or CAMS math biol majors.