MATHEMATICS
TEXAS A&M UNIVERSITY

Fall 2016 – Spring 2017 Undergraduate Handbook

Welcome to the Department of Mathematics Undergraduate Program at Texas A&M University. Texas A&M was founded in 1876 and is the oldest public institution of higher learning in the State of Texas. Two of the original six professors at Texas A&M University were mathematicians. There are currently 120 instructors, 150 graduate students, and 575 undergraduates in the Mathematics Department.

The Undergraduate Mathematics Program offers three degrees which allow our majors to choose a plan that is best suited to their academic and career objectives:

- *Bachelor of Arts in Pure Mathematics (BA)*
- *Bachelor of Science in Pure Mathematics (BS)*
- *Bachelor of Science in Applied Mathematics (APMS -* six emphases: math, actuarial science, statistics, computational science, economics, and math biology *)*

Questions relating to this handbook can be directed to:

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We are also online. You can visit our web site at:

http://www.math.tamu.edu/undergraduate

Important Campus Telephone Numbers/Emails

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Admissions	845-1031
Bus Operations	845-1971
Campus Bookstore	845-8681
Campus Information	845-3211
College of Science Dean's Office	845-7361
Student Affairs Office	845-7362
Cooperative Education Office	845-7725
Degree Audit	845-1089
Dial-A-Ride	847-7433
Evans Library	845-5741
Financial Aid	845-3236
University Honors Program Office	845-1957
Math Department (Main Office)	845-3261
Data & Research Services (DARS)	845-0532
Placement Center	845-5139
Registrar's Office	845-7117
Statistics Department	845-3141
Student Counseling	845-1651
Student Fees Office	845-8127
Student Locator	845-4741
Transfer Admissions	845-1098

Why Should You Major in Math?

There are a number of important benefits associated with being a mathematics major at TAMU:

- **Flexible Degree Plans** - Our degree plans offer more elective hours and flexibility than any other degree plan on campus. The requirements and options for each plan are listed in this handbook, and each plan requires 120 credit hours.

- **Honors Opportunities in Math** – Honors majors are encouraged to take special courses, may be honors mentors, may earn an MS and BS in 5 years, and have extra opportunities to advance their career goals. Earning the Honors in Mathematics distinction makes the student more attractive to future employers and graduate schools.

- **Job Opportunities -** Almost all of our majors have jobs prior to graduation. Currently, 50% of our majors plan to work in industry, 20% plan to attend graduate school, and 30% plan to teach.

- **Graduate School Opportunities -** The variety of graduate school choices available to mathematics majors is perhaps the largest amongst all majors on campus.

- **Small Class Size** - Typical mathematics courses have an enrollment of 40 or less during the freshman year, and 30 or less in subsequent years. The overall student to professor ratio in the Math Department is extremely small, offering small classroom settings to its undergraduate majors. This also results in ample opportunities for students interested in undergraduate research projects.

- **Student Lounge** - The Undergraduate Program Office is very fortunate to have one of the few student lounges on campus. Math majors have access to this lounge 24 hours a day. Use the code

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31425

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  to access the lounge after hours. On any given day, it is typical to find students working on assignments, using one of the computer terminals, eating lunch or simply hanging out in between classes. This lounge provides a relaxed environment for our majors to study or escape from the stress of their day.

- **Friendly and Helpful Advisors** - The advisors make it a point to know each student. They are always willing to help with any questions you might have relating to your degree and classes.

B. A. MATH
(requires minor/area of emphasis)

- **120 total hours**
- **39 hours of MATH**
- **12 hours of Science**
- **3 hours STAT; 4 hours CSCE**
- **29 hours of free electives**

Often used by students wanting Teacher Certification, or to supplement their math degree with another field of study.

Career Options with a BA in Mathematics

The BA in Mathematics is designed primarily for students who are interested in teaching, pursuing a professional degree in medicine or law, and those students who are interested in both mathematics and some other area. The BA in Mathematics requires the fewest number of hours of mathematics and has 27 hours of free electives, but it does require that at least 15 hours be taken in some focused area of study other than mathematics. Students planning to attend a professional school (medical, dental, law, etc.) may use the 27 hours of free electives for courses required for the school. Please see the Office of Professional School Advising (OPSA) website for more details: http://opsa.tamu.edu/index.shtml.

Students interested in the liberal arts and who can write will find that this degree plan with a minor in English or Communications is greatly desired by employers. In particular, technical firms frequently need people who can produce a logical argument and then explain it to others. Newspapers and publishing houses are other places such graduates are valued.

First Semester		Second Semester	
MATH 171	4	MATH 172	4
MATH 170 (elec)	1	MATH 170 (elec)	1
Science elective	4	Science elective	4
HIST/POLS	3	CSCE 110, 111, 206, or 121	4
CORE elective	3	HIST/POLS	3
	15		16

Third Semester		Fourth Semester	
MATH 221	4	MATH 323	3
MATH 220	3	MATH 308	3
HIST/POLS	3	HIST/POLS	3
STAT 211	3	Free elective	3
CORE elective	3	CORE elective	3
	16		15

Fifth Semester		Sixth Semester	
MATH 409	3	MATH elective	3
PHYS 218	4	MATH elective	3
CORE elective	3	CORE elective	3
Free elective	3	Free elective	3
Free elective	3	Free elective	3
	16		15

Seventh Semester		Eighth Semester	
MATH elective	3	MATH elective	3
MATH elective	3	CORE elective	3
CORE elective	3	Free elective	3
Free elective	3	Free elective	3
Free elective	3		
	15		12

DESCRIPTION OF ELECTIVES

MATH electives: (15 hours required) Choose 3 hours from MATH 415, 423, or 433. Nine (9) of the twelve remaining hours must be selected from MATH 4xx or Math 6xx, excluding MATH 401 and MATH 601. The remaining 3 hours must be selected from MATH 4xx, MATH 6xx, STAT 4xx, CSCE 210-499, or ISEN 320 or 340, excluding MATH 401, MATH 601, and any 485 course without permission of a departmental advisor. Students who plan to attend graduate school in mathematics or math education are encouraged to take MATH 416, 446, 447, and at least one MATH 6xx course. Departmental permission is required to enroll in a MATH 6xx course. Students who want Teacher Certification must take MATH 403, 467, and either 415 or 433 from the first list. ***NOTE*** *Credit will not be given for more than one of MATH 411 and STAT 414.*

SCIENCE electives: (12 hours) Take PHYS 218 (4 hours), and select 2 courses from CHEM 101/111, CHEM 102/112, BIOL 111, BIOL 112, ASTR 111.

HIST/POLS: POLS 206 and 207 are required. For the HIST requirement, 6 hours of American History are required. Most students satisfy this requirement by taking HIST 105 and 106. For other options, see your catalog.

CORE electives: (21 hours) Take ENGL 104 (3 hours), COMM 203, 205, or 243 (3 hours), a 200-400 level Language, Philosophy and Culture CORE course (3 hours), a Social and Behavioral Science CORE course (3 hours) and 3 hours of a Creative Arts CORE course. For a list of the acceptable Language, Philosophy and Culture, Social and Behavioral Science, and Creative Arts courses, please see your catalog or the Mathematics Department's Undergraduate website. In addition, 6 hours of International and Cultural Diversity are required. Some of these courses may be used to satisfy other degree requirements. For a list of these courses, see your catalog, the Mathematics Department's Undergraduate website, or page 15 of this handbook. Students who want Teacher Certification must take INST 210 (Social and Behavioral Science and International/Cultural Diversity) and SOCI 317 or equivalent (International/Cultural Diversity).

Free electives: (29 hours) Free electives for the BA should include up to 18 hours in a minor or area of emphasis. To satisfy this requirement, students should either fulfill the minor requirements for a particular department or see a math advisor for help in selecting an area of interest. Students who want Teacher Certification must take TEFB 222, TEFB 324, SCEN 489, RDNG 465 (15 hours), and TEFB 429, Student Teaching (12 hours.) Almost every course offered at TAMU will count as a free elective. However, there are some exceptions. Please see an advisor or the Math Department's Web page for a list of unacceptable courses. NOTE: There is a residency requirement at TAMU which states that every student must take at least 36 hours of 300/400 level courses at TAMU. Therefore, depending upon what courses were taken to fulfill the CORE requirements, some free elective courses may have to be 300/400 level courses. Math 170 counts as free elective hours. Please see an advisor or the Mathematics Undergraduate Web Page for a complete list of unacceptable courses. A general rule is that any course lower than one required may not be used as an elective, e.g., Math 1xx below 151 and 166, 167, Stat 201, 301 et. al., Phys 201 et. al., Chem 113.

Foreign Language Requirement: (8 hours) If you have taken at least 2 years of the same foreign language in high school, then you have satisfied this requirement. Otherwise, you must take 8 hours of the same foreign language. These 8 hours will count towards free elective hours.

B. S. MATH

- **120 total hours**
- **48 hours of MATH**
- **26 hours of Science**
- **4 hours of CSCE**
- **9 hours of free electives**

Often used by students wanting graduate study in mathematics.

Career Options with a BS in Mathematics

The BS in Mathematics is the "pure mathematics" degree. The mathematics courses required by this degree prepare students for graduate school in mathematics, physics, and engineering. Because this option requires a total of 26 hours of science courses, 10 hours more than the APMS degree, it is also a good degree for students who are intersted in science as well as mathematics and pre-med students. If you are planning to attend a medical school, the BS and BA in Mathematics are the best degree plans. Please see the Office of Professional School Advising (OPSA) website for more details: http://opsa.tamu.edu/index.shtml.

For students not planning to pursue an advanced degree, the jobs open to graduates with a BS in Mathematics are similar to the job opportunities of APMS/MATH graduates. Technical companies that have hired recent graduates include Microsoft, Apple, Google, and CGG Veritas. These firms hire people to be software engineers and to design web pages. Software development firms can pay very well, but they expect prospective employees to be able to program. This degree plan only requires 4 hours of computer science, so it would be wise to take one or two more CSCE courses if you want a job with a high tech firm.

In summary, there are many job opportunities available with this degree, but this degree will not train you for a specific profession. It would be best to start attending job fairs in your freshman year to get an idea of what sort of jobs interest you and what courses besides math courses will strengthen your resume.

First Semester			**Second Semester**	
MATH 171	4		MATH 172	4
MATH 170 (elec)	1		MATH 170 (elec)	1
Science elective	4		Science elective	4
HIST/POLS	3		CSCE 110, 111, 206, or 121	4
CORE elective	3		HIST/POLS	3
	15			16

Third Semester			**Fourth Semester**	
MATH 221	4		MATH 323	3
MATH 220	3		MATH 308	3
HIST/POLS	3		HIST/POLS	3
Science elective	4		PHYS 218	4
CORE elective	3		CORE elective	3
	17			16

Fifth Semester			**Sixth Semester**	
MATH 409	3		MATH 410 or 446 (fall only)	3
MATH 415	3		MATH 416	3
Science elective	3		PHYS 208 or OCNG 451	4
CORE elective	3		CORE elective	3
Free elective	4		Free elective	3
	16			16

Seventh Semester			**Eighth Semester**	
MATH 411or STAT 414	3		MATH elective	3
MATH elective	3		MATH elective	3
Science elective	3		MATH elective	3
CORE elective	3		CORE elective	3
	12			12

Description of Electives

MATH electives: (12 hours required) 3 THRU 12 hours to be selected from MATH 427, 431, 436, 439. Up to 9 hours may be selected from MATH 325, 407-489. Students are encouraged to take one of MATH 412, 414, 442, or 470. Departmental permission is required to include MATH 485 or to enroll in a MATH 6xx course. Students who plan to atttend graduate school are encouraged to take MATH 446 rather than MATH 410 and to take MATH 447 and at least one 6xx class, except MATH 601, as electives.

SCIENCE electives: (26 hours) Take PHYS 218 (4 hours), and select 4 hours from PHYS 208 or OCNG 451. Eight (8) hours must be selected from CHEM 101/111, CHEM 102/112, BIOL 111, BIOL 112, ASTR 111, and 6 hours must be selected from BICH 401-489, BIOL 201-470, CHEM 222-474, GENE 301-452, OCNG 251, 252, 400-489, PHYS 221, 302-305, 307-314, 324-428, ZOOL 318-405. The remaining 4 hours may be selected from any course listed above.

HIST/POLS: POLS 206 and 207 are required. For the HIST requirement, 6 hours of American History are required. Most students satisfy this requirement by taking HIST 105 and 106. For other options, see your catalog.

CORE electives: (21 hours) Take ENGL 104 (3 hours), COMM 203, 205, or 243 (3 hours), a 200-400 level Language, Philosophy and Culture CORE course (3 hours), a Social and Behavioral Science CORE course (3 hours), and 3 hours of a Creative Arts CORE course. For a list of the acceptable Language, Philosophy and Culture, Social and Behavioral Science, and Creative Arts courses, please see your catalog or the Mathematics Department's Undergraduate website. In addition, 6 hours of International and Cultural Diversity are required. Some of these courses may be used to satisfy other degree requirements. For a list of these courses, see your catalog, the Mathematics Department's Undergraduate website, or page 15 of this handbook.

Free electives: (9 hours) Almost every course offered at TAMU will count as a free elective. However, there are some exceptions. Please see an advisor or the Mathematics Undergraduate Web Page for a complete list of unacceptable courses. A general rule is that any course lower than one required may not be used as an elective, e.g., Math 1xx below 151 and 166, 167, Stat 201, 301 et. al., Phys 201 et. al., Chem 113. Math 170 counts as free elective hours.

Foreign Language Requirement: (8 hours) If you have taken at least 2 years of the same foreign language in high school, then you have satisfied this requirement. Otherwise, you must take 8 hours of the same foreign language. These 8 hours will count towards free elective hours.

B. S. APMS

- **120 total hours**
- **52 hours of MATH (includes up to 9 hours in a supporting "area of emphasis")**
- **16 hours of Science**
- **6 hours STAT; 8 hours CSCE**
- **Free electives vary by emphasis**

Often used by students wanting a career in areas such as computer science (IT), business, actuarial science, or statistical analysis. Areas of emphasis can prepare students for graduate study in mathematics, computer science, finance, economics, or statistics

Career Options with an APMS Degree

The BS degree in Applied Mathematics has six emphases: Math, Actuarial Science, Economics, Statistics, Computational Science, and Biological Science. The APMS degree is the most flexible degree and prepares students for the widest possible number of careers.

Over half of the APMS graduates seeking employment directly after graduation look to business, in particular consulting firms and technical companies. All of these companies are looking for people with good problem solving skills. Employers need to be able to train new employees to solve their particular technical problems. In the broadest possible terms, math graduates are hired to work as part of a problem solving team. See the next page for career information on specific areas of emphasis within the APMS degree.

Math Emphasis: Students getting a BS in Applied Mathematics with the Math Emphasis have prepared themselves for graduate school in Mathematics and employment with high-tech firms, engineering firms, and consulting companies. The career opportunities with high-tech firms will depend in part on a student's programming ability and willingness to take a job which requires some programming. Recently Hewlett Packard hired a graduate to work in their mathematical programming group. Texas Systems and Tivoli Systems hire graduates to be software engineers. All these jobs require employees to be able to both program and do mathematics. There is a high demand for mathematicians with programming skills. However, the type of high-tech jobs that are available changes greatly from year to year. The best way to determine what is currently hot is to go to the Engineering Job Fair, the Sciences Career Fair, and the Career Center.

Actuarial Science Emphasis: Students pursuing an Applied Mathematics degree with the Actuarial Science Emphasis have chosen a degree that is suited to a career in business, particularly actuarial and financial consulting. An actuary is a mathematician who analyzes risk. Pension actuaries work with client firms to help them determine their retirement liability and funding status, while casualty actuaries work in insurance firms and run statistical models to determine proper insurance premiums. Actuarial and financial consulting firms that have hired recent graduates include AIG, Aon Hewitt, EY, Fidelity, Forethought Financial, Houston Casualty Company, Mercer, Towers Watson, and USAA. A minor in business or economics is well suited to this degree plan. Some graduates with this degree go on to graduate school in finance, economics, or business, but if you are interested in a graduate-level mathematics or mathematical finance degree, you will need to take additional mathematics courses. Those who want to pursue this degree but are also interested in teacher certification should consider Post Bac Certification or emergency certification.

Statistics Emphasis: The government always needs mathematicians. The CIA, NSA, FBI, NIST and Census Bureau need mathematically trained personnel. Some former students have been hired by the state transportation division. Most of the students who graduate with an APMS/STAT degree go on to graduate school in statistics. At present, there is a shortage of statisticians. A Masters in Statistics will greatly improve the chance for a high paying job. Career options also greatly increase with a masters degree. People with a masters degree have recently found positions with banks, INTEL, pharmaceutical firms, and biotech firms.

Economics Emphasis: Like the Actuarial Science Emphasis, graduates of this degree plan can be hired to be business analysts, financial analysts, and actuaries. A minor in business is well suited to this degree plan. Some graduates with this degree go on to graduate school in economics, finance, and business. A Masters degree will greatly improve the chance for a high paying job. Career options also greatly increase with a Masters degree.

Computational Science Emphasis: Some graduates with this degree will go on to graduate school in Computer Science or seek employment with such companies as Apple, Google, and Microsoft, and government agencies such as NSA, and NASA. A Masters in Computer Science will greatly improve both pay and career options both at places listed for the BS and other types of firms needing advanced IT help.

Biological Sciences Emphasis: Students graduating with an APMS degree with an Emphasis in the Biological Sciences have chosen a degree that is suited to a career in applications of mathematics to the life sciences. The 21st century has been dubbed the Century of the Life Sciences. The life sciences are poised for revolutionary advances in this century. Among the many areas of the life sciences in which mathematics makes enabling contributions are: genomics, computational neuroscience, modeling human and animal physiology, epidemiology, ecology, and pharmacology. Breakthroughs in these fields will be made by interdisciplinary teams of scientists, statisticians and mathematicians working in commercial (industrial) laboratories, governmental laboratories, privately or publicly funded research centers, and universities. Information on career opportunities in mathematics applied to the life sciences can be found at the websites of the Society for Mathematical Biology (http://www.smb.org/) and the Society of Industrial and Applied Mathematics (http://www.siam.org/). A minor in biology or some other area of the biological sciences is well suited to this degree plan. This degree plan will prepare you for graduate work in mathematics or statistics with an emphasis in applications to the biological sciences. People interested in teaching as one of several possible options should consider Post Bac Certification or Emergency Certification. If you are interested in this option, there are specific math courses that should be chosen for your math elective courses.

First Semester			**Second Semester**	
MATH 171	4		MATH 172	4
MATH 170 (elec)	1		MATH 170 (elec)	1
Science elective	4		Science elective	4
CSCE 110, 111, 206, or 121	4		CSCE 110, 111, 206, or 121	4
CORE elective	3		HIST/POLS	3
	16			16

Third Semester			**Fourth Semester***	
MATH 221	4		MATH 323	3
MATH 220	3		MATH 308	3
STAT 211	3		STAT 212	3
HIST/POLS	3		HIST/POLS	3
ECON 202 or 203	3		CORE elective	3
	16			15

Fifth Semester			**Sixth Semester**	
MATH 409	3		Emphasis elective	3
Emphasis elective	3		Emphasis elective	3
PHYS 218	4		PHYS 208, or OCNG 451	4
HIST/POLS	3		CORE elective	3
CORE elective	3		Free elective	3
	16			16

Seventh Semester			**Eighth Semester**	
MATH 417or 437 (Econ emph: MATH 411or STAT 414)	4 (3)		Emphasis elective	3
Emphasis elective	3		Emphasis elective	3
Emphasis elective	3		Emphasis elective	3
CORE elective	3		CORE elective	3
	13			12

*Note: If you plan to pursue a career in actuarial science, the recommended courses for your fourth semester will be different from those listed above. Please schedule an appointment with Mrs. Ramsey to discuss what courses should be taken that semester to help you start preparing for actuarial exams.

Description of Electives

EMPHASIS electives: (24-33 hours required) Based on the following areas of emphasis:

Math: Take 3 hours from MATH 410 or MATH 446, 3 hours from MATH 415 or MATH 433, 3 hours from MATH 412, 414, 442, 470 or 471, 9 -15 hours may be selected from MATH 325, 407-489. Up to 6 hours may be selected from STAT 407-415, CSCE 210-452, 461-481, ISEN 320 or 340. *NOTE* *Credit will not be given for more than one of MATH 411 and STAT 414.*

Actuarial Science: Take MATH 325, MATH 425, STAT 414 or MATH 411, and MATH 419; 6 hours from MATH 407-489, STAT 407-415, CSCE 210-499, ISEN 320, 340, and 9 hours from ECON 311-489, FINC 309-489, ECMT 463. MATH 411 should be taken the semester after taking MATH 221.

Statistics: Take STAT 407, STAT 408, STAT 414 or MATH 411, 3 hours from ISEN 320 or 340; 6-12 hours may be selected from MATH 325, 407-489, STAT 410, 415, 485, 489, and up to 6 hours may be selected from CSCE 210-499, ISEN 400-499, and STAT 400-499.

Economics: Take MATH 411 or STAT 414 instead of MATH 417 or MATH 437. Take MATH 325, MATH 425, ECON 323 (requires ECON 202), ECON 459, ECMT 463, ISEN 320 or 340, and 6 hours from MATH 405-489.

Computational Science: Take MATH 415 or 433, CSCE 221, 314, 411, 433; 9 – 12 hours may be selected from Math 325, 407-489. Up to 3 hours may be selected from CSCE 210-452, or ISEN 320, 340, STAT 407-415.

Biological Science: Consult with a departmental advisor.

SCIENCE electives: (16 hours) Take PHYS 218 (4 hours), and select 4 hours from PHYS 208 or OCNG 451. Eight (8) hours must be selected from CHEM 101/111, CHEM 102/112, BIOL 111, BIOL 112, ASTR 111. Note: The Biological Science Emphasis requires more than 16 hours of science.

CSCE electives: (8 hours) Select 2 courses from CSCE 110, 111, 206, or 121.

HIST/POLS: POLS 206 and 207 are required. For the HIST requirement, 6 hours of American History are required. Most students satisfy this requirement by taking HIST 105 and 106. For other options, see your catalog.

CORE electives: (21 hours) Take ENGL 104 (3 hours), COMM 203, 205, or 243 (3 hours), ECON 202 or 203 (satisfies 3 hours of Social and Behavioral Science), a 200-400 level Language, Philosophy and Culture CORE course (3 hours), and 3 hours of a Creative Arts. For a list of the acceptable Language, Philosophy and Culture, and Creative Arts courses, please see your catalog or the Mathematics Department's Undergraduate Web page. In addition, 6 hours of International and Cultural Diversity are required. Some of these courses may be used to satisfy other degree requirements. For a list of these courses, see your catalog, the Mathematics Department's Undergraduate website, or page 15 of this handbook.

Free electives: (3-11 hours) Almost every course offered at TAMU will count as a free elective. However, there are some exceptions. Please see an advisor or the Mathematics Undergraduate Web Page for a complete list of unacceptable courses. A general rule is that any course lower than one required may not be used as an elective, e.g., Math 1xx below 151 and 166, 167, Stat 201, 301 et. al., Phys 201 et. al., Chem 113. MATH 170 counts as free elective hours.

Foreign Language Requirement: (8 hours) If you have taken at least 2 years of the same foreign language in high school, then you have satisfied this requirement. Otherwise, you must take 8 hours of the same foreign language. These 8 hours will count towards free elective hours.

Major in Mathematics with Honors

What is an Honors Mathematics Program?

The Mathematics Department offers a variety of honors courses. Mathematics majors who fulfill specific requirements, basically to take seven honors mathematics courses, can graduate with Honors in Mathematics. (An Honors Minor in Mathematics is also available.) Other honors programs, with overlapping but different requirements, are Honors in Science and University Honors Fellows.

What is an honors course?

"Honors courses are intended to be more complex, not necessarily more difficult," and "are expected to provide increased intellectual challenge through more sophisticated material, a higher level of intellectual engagement, and more responsibility for the learning process than would typically be expected in an undergraduate course," says the university. The philosophy of the Mathematics Department is that honors students should be more intellectually curious, more motivated, and more independent than the average undergraduate.

Perks of being an Honors Mathematics Major

- Smaller, more interesting classes and the best professors (and, when possible, a reduction in routine busywork).
- Honors priority registration, which is the first two days of the pre-registration period.
- An increased probability of being taken to mathematics conferences with all expenses except for food paid for by the department.
- An increased probability to be hired for the higher paying jobs such as undergraduate TA.
- A few honors mathematics students are invited to be Honors Mentors, students who run help sessions for honors classes they have earned an A in.
- A greatly increased probability of being accepted into FastTrack, our five year combined bachelors/masters program in mathematics.
- Looks great on a resume.

Becoming an Honors Mathematics Major

- Qualified entering freshmen are invited into the math honors program at their new student conferences.
- Any mathematics major with at least a 3.5 GPA may ask the Director of Honors Programs in Mathematics to be added to the honors program in mathematics as long as the student can still take the required seven honors mathematics classes before graduation.

  NOTE: Any student with at least a 3.5 GPA may take an honors class if there are seats available, but doing so does not, by itself, earn the student the Honors distinctions nor gain any of the perks listed above. Any honors classes taken before entering an Honors Program (e.g., Honors in Mathematics, College of Science Honors) can be used to fulfill the program requirements.

Remaining in the Honors Mathematics Program

1. Maintain at least a 3.5 GPA.
2. Take at least one honors math class each academic year.

Students with under a 3.5 but high enough GPA to be over a 3.5 at the end of the next semester will be put on probation for one semester and removed from the program if they are under a 3.5 a second consecutive semester.

Exceptions to Rule 2 must be approved by the Director of the Honors Programs in Mathematics. A year-long study abroad program in which there is no opportunity to take an honors mathematics class is an example of an acceptable reason.

Reinstatement into the Honors Mathematics Program

To be reinstated into the Honors Mathematics Program, the student must meet all the requirements to become a mathematics honors student and be registered for an honors mathematics class in the semester in which reinstatement is requested from the Director of Honors Programs in Mathematics.

Requirements to earn the transcript distinction of Honors in Mathematics

In order to receive Honors in Mathematics, a mathematics major must complete all of the requirements for a BA or BS in Math or a BS in APMS of which 21 hours must be completed as follows:
1. at least 3 hours in an honors mathematics course 100 level (calculus I H does not count towards the honors in mathematics distinction but does count towards the at least one honors math class each academic year) or above,
2. additionally at least 3 hours in an honors mathematics course 200 level or above,
3. additionally at least 3 hours in an honors mathematics course 300 level or above,
4. additionally at least 9 hours in honors mathematics courses 400 level or above,
5. additionally at least 3 hours from one of the following:
    a. a graduate mathematics class other than 601, 695, 696
    b. Math 482H - Research Seminar in Mathematics
    c. Math 485H - Only when used for credit for an internship
    d. Math 491H - supervised research, supervised projects for business/industry or education, or honors credit for an REU.

NOTES:
- A maximum of 4 hours of AP credit may be used for Calculus II by earning a 5 on the Calculus BC exam and taking the credit for Calculus II through Howdy for Math 172/Math 152 as long as Calculus II is not retaken. Note that Howdy gives the 172 option sometimes and the 152 option other times. Simply take what is offered and don't worry. Calculus I honors does not count towards earning honors in mathematics whether by AP credit or taking it here as an honors class.
- With very few exceptions, e.g., earning an A at Budapest Semesters in Mathematics or from AP honors credit as discussed right above, all math honors courses must be taken at Texas A&M.
- A maximum of 6 hours total of 485H, 491H are normally allowed. Only under very unusual circumstances will the Director of Honors Programs in Mathematics allow 9.
- To earn credit for an internship (485H) or for an REU (491H), the student must see the Director of Undergraduate Research in Mathematics (or, for an actuarial internship, the Actuarial Advisor) after spring break but before finals of the spring term to set up the course and to fill out paperwork.

Grade requirements at the time of graduation:

1. a cumulative grade point average of at least 3.5;
2. a grade point average of at least 3.25 and no grade lower than a B in the 21 required honors hours;
3. no grade of F* on the transcript.

Eligible Mathematics Courses when offered; no guarantee that they will be:

- 172H (171H does not count towards the honors major distinction!)
- 220H, 221H
- 308H, 323H, 325H
- all 400-level honors math courses except 401, 403, 433, 490; as above 485H and 491H credit for an REU. No more than a combined total of 6 hours of 485H and 491H courses may be counted towards mathematics honors. Only under very unusual circumstances will the Director of Honors Programs in Mathematics allow 9.
- all 600-level courses except 601, 695, 696.

NOTES:

1. When no honors section of an eligible course is available, individual students have the option to negotiate an honors contract with the instructor. The steps for an honors contract are:
    1. Ask the professor if an honors contract would be possible.
    2. Ask the professor what such a contract would entail.
    3. If both of you agree, you need to fill out the Honors Course Contract & Honors Independent Study Applications. You will need to log in under your TAMU userid to bring up the form. It is recommended that you and your professor fill out the form online together.
    4. Submit the form online. **This must be done before the 12th class day of the semester in which the contract is in effect.**
    5. Fulfill the agreed upon contract.
2. Honors Fellow requires 30 honors hours taken at A&M. College of Science Honors requires 28 hours. All of the hours for Math honors will count towards College of Science Honors and those taken at A&M towards Honors Fellow.
3. Three sample programs to fulfill the honors requirements are:
    1. 172H, 220H, 323H, 409H, 425H, 484H, 470H
    2. 220H, 308H, 323H, 409H, 424H, 467H, 629
    3. 409H, 415H, 416H, 446H, 447H, 482H, 491H

International and Cultural Diversity
Core Curriculum Requirement

Students are required to take 6 hours of International and Cultural Diversity; however, these courses (and only these courses) can be applied to a second University Core Curriculum requirement if possible. To avoid taking extra required courses (and therefore having more free electives in your degree plan), the following is a summary of International and Cultural Diversity courses which also satisfy other requirements for one of the Mathematics degrees. Updates to these lists can be found at **http://core.tamu.edu** .

(*-indicates that the course has a prerequisite which is not built into any of the Mathematics degree plans)

Language, Philosophy and Culture Courses
AFTS 204, 345; ANTH 205, 210; ARAB 201-202; ARCH 213; CARC 331; CHIN 201-202; COMM 327; ENGL 204, 206, 221-222, 232, 333, 338, 362, 374, 376; FREN 201-202; FSTC 300; GEOG 301, 305; GERM 201-202; HISP 362; HIST 210, 214, 345; INTS 251; ITAL 201-202; JAPN 201-202; LAND 240; MODL 221-222; MUSC 201, 227, 325-326; NUTR 300; PERF 325-326; RELS 312; RUSS 201-202; SPAN 201-202; SPMT 220; THAR 156, 281; WGST 200, 333, 374

Creative Arts Courses
ANTH 324, ARCH 249, ARCH 250, ARCH 350, ARTS 150, DCED 202, ENDS 101, FILM 251, FILM 425, FREN 425, HISP 205, MUSC 221, MUSC 222, MUSC 226, MUSC 301, MUSC 324, MUSC 328, MUSC 386, PERF 301, THAR 101, THAR 201, THAR 301, THAR 328, THAR 386

Social and Behavioral Science Courses
(NOTE: Applies to BA Math and BS Math only. All APMS degree plans require ECON 202 or ECON 203 to satisfy the Social and Behavioral Science requirement)

ALEC 450, ANTH 201, ARCH 212, ARCH 458, COMM 335, COMM 365, EPSY 320, GEOG 201, HLTH 236, INST 210, INST 222, JOUR 365, MARS 210, SOCI 205, SOCI 206, SOCI 207, SOCI 212, SOCI 217, SOCI 312, SOCI 313, SOCI 314, SOCI 315, SOCI 327, SPMT 336, SPMT 337, WGST 207

Upper-Level Economics Courses
(NOTE: Applies to APMS Actuarial Science Emphasis majors and Economics minors)
ECON 312*, 318*, 320*, 324*, 330*, and 452*

TEACHER CERTIFICATION

The demand for secondary mathematics teachers is always strong. There are three paths a student may choose from to obtain secondary (8-12) math certification:

I. AGGIE TEACH program certification

This is the program outlined in the BA MATH (Certification) plan. Students must complete 22 hours of education courses: SCEN 289, TEFB 222, TEFB 324, INST 210, TEED 649 (which can be used for undergraduate credit), and student teaching (TEFB 429). In addition, students must complete RDNG 465, 9 hours of English, and 3 hours of multicultural studies (SOCI 317 or equivalent). ENGL 336, 338, 339, or 362 may be taken to simultaneously satisfy 3 hours of the English requirement and the 3 hour multicultural requirement. Students interested in becoming certified through the AGGIE TEACH program should contact Dr. Tim Scott or Jennifer Whitfield in Blocker 514, then obtain a Teaching Field Plan from Dr. Vince Schielack (979-845-2831) before completing a Certification Plan from the College of Education in Harrington Tower, Room 107. Students completing this plan will be certified upon graduating and passing the TExES exams for certification.

II. Post-baccalaureate certification

Students who choose this option need to complete 9 hours of education courses: TEED 302 or INST 210, TEFB 222, and TEFB 324. After graduating with at least a 2.75 GPA, students enter graduate school at Texas A&M in the college of education and take 9 hours of courses in the summer, then 12 hours of courses during a one-year internship. Students completing this plan will be certified upon completing the 21 hours of graduate courses, the internship, and passing the TExES exams for certification. If a student wishes to complete a Masters Degree in Education, they only need 15 additional hours after certification.

III. Alternative (Accelerated) Certification

Many institutions offer one-year alternative certification programs after graduation. The requirements for these programs vary by institution. Students interested in alternative certification should contact the institution they wish to attend to pursue this for specific requirements.   Typically, students who choose this option will be certified upon completing their degree, one year of teaching, and passing the TExES exams for certification.

Contact Dr. Vince Schielack at
vinces@math.tamu.edu
or Jennifer Whitfield at
jwhitfld@math.tamu.edu
for more information

ADVISING PROCEDURES

All undergraduate mathematics majors should consult with an advisor at least once per semester, prior to registering for courses.

Honors students: Please see your assigned advisor, one of Drs. Anselevich, Berkolaiko, Geller, and Masri. If unsure, email one of them and ask them to look your advisor up for you. You will have the same advisor for all the time you are in the math honors program.

Non-honors students: See Mrs. Heather Ramsey if in the actuarial science emphasis of APMS.

See Dr. Mila Mogilevsky, Mr. David Manuel, or Mr. Ben Aurispa if enrolled in less than Math 409 and not in the actuarial emphasis. See Dr. Mike Stecher or Dr. Tom Vogel if enrolled in Math 409 or higher.

It is advisable to schedule an appointment ahead of time by going to the advising page--

http://www.math.tamu.edu/undergraduate/advising

If Dr. Geller has no available spaces, email her at geller@math.tamu.edu, for an appointment. For questions during the semester you can also visit the advising page on the undergraduate web site

http://www.math.tamu.edu/ugs/advising.html

Students can use this page to obtain on-line advising, to contact an undergraduate advisor, or to contact the Undergraduate Program Office.

All students are required to see Dr. Stecher by the end of their junior year, to ensure they will graduate. *Graduating seniors MUST apply for graduation online in the HOWDY portal at the beginning of the semester in which they expect to graduate.* Failure to do so will result in delayed graduation.

Independent of this process, the Registrar periodically compiles computerized degree audits for students with 95+ hours. The degree audit lists the courses completed along with any remaining graduation requirements. If there is a discrepancy between the degree plan and the degree audit, Dr. Stecher will submit course substitution request forms to the College of Science Student Affairs Office to satisfy the degree audit.

MISCELLANEOUS INFORMATION

Grade Point Requirements

All students must maintain both an overall grade point average and a mathematics grade point average of at least 2.0. **If a grade of D or F is earned in any of the following courses, Math 171/151, 172/152, 221/251/253, 220, 323, or 308, this course must be *immediately* retaken and a grade of C or better earned. The department will allow at most two (2) D's in upper level (300-400) math courses. If a third D is earned, one of the three courses in which a D was earned must be retaken and a grade of C or better earned.** The mathematics grade point average is the average of all grades in mathematics and statistics courses. Grades of S are not included in the GPA calculation. However, a grade of U is treated the same as a grade of F in the GPA calculation.

Writing Requirement

All TAMU students must take two (2) W courses which fulfill the graduation requirement for writing (W courses). Students may opt to take one W and one C (communications) course or two W courses. This requirement may not be met by any course listed as a University Core Curriculum communication requirement, nor may it be met through credit-by-examination. All math majors are required to take Math 220 which counts as one W course. Other eligible W courses are RDNG 372 (primarily for BA certification majors), ECMT 463 (for APMS - Actuarial Science and APMS – Economics), and MATH 467 or the C courses MATH 442, MATH 482, and the one hour MATH 396.

Residency Requirement

Students must satisfy the University residency requirement by completing 36 hours of upper level courses (300 - 400 level) at Texas A&M University.

Undergraduate Degree Planner

All students entering Texas A&M University in Fall 2013 or later are required to complete an online undergraduate degree plan. The Undergraduate Degree Planner is in Howdy on the My Record tab in the Undergraduate Degree Planner channel. Guides for using the Undergraduate Degree Planner are also available in Howdy. Completing the degree plan is important as it will help you plan your courses and graduate in the least amount of time.

Foreign Language Requirement for the Core Curriculum

The foreign language requirement for the core curriculum states that a student must either complete two years of high school foreign language (in the same language) or complete two semesters of college foreign language (in the same language).

Free Electives

Aside from minor restrictions, a free elective is a course which is not used for a specific degree requirement. A list of ineligible free electives is posted on the Undergraduate Program Website. Any course which is more elementary than a required course in the student's major may not be used as a free elective. For example, no mathematics course numbered below MATH 403 may be used as a free elective, except Math 325, 365 and 366. Students must use free electives to satisfy core curriculum and residency requirements which are not satisfied by their specific degree plan. Excess free electives can be taken at the discretion of the student and the approval of the Undergraduate Program Office.

English 104 Restrictions

The English Department has placed restrictions on the number of juniors and seniors who may enroll in English 104. ENGL 104 is a freshman level course which teaches composition skills to be utilized in advanced courses. As a result, if you plan to take ENGL 104 here at TAMU, it <u>MUST BE TAKEN BEFORE YOU ACHIEVE 60 CREDIT HOURS</u>. If you feel you have extenuating circumstances, you will need to contact the English Department located in the Liberal Arts and Arts & Language, Philosophy and Culture (LAAH) building.

200-Level English Literature Classification Restrictions

To comply with the State's and University's request that enrollments in lower-division courses be limited to lower-division students and upper-division, to upper-division, the Department of English is restricting enrollments, ENGL 221, 222, 227, 228, 231, and 232 to U1 and U2 classifications. Students enrolling in these 200-level courses who are currently U2 but who will become U3 at the close of a semester will be allowed to remain in the courses.

Credit by Examination

Credit by examination is available for courses in biology, chemistry, computer science, economics, English, foreign languages, mathematics, physics, psychology, political science, and history. Students may obtain credit by exam through a variety of college board advanced placement exams or through departmental exams administered by Data and Research Services (DARS) located in the General Services Building on Agronomy Road.

Accepting Advanced Placement (AP) Credit

Advanced Placement (AP) credits from courses taken in high school do not automatically appear on a students transcript. In order to formally accept AP credit from high school courses, students must do so in the Howdy system. This is necessary because some students elect to retake high school courses rather than accept their AP credit. Note: AP credit for Statistics or Physics B cannot be used for credit for a math major even as a free elective, so it is recommended that these credits not be accepted. It is possible to accept them later should a student change to a major that will accept the credit(s).

Preparation For Actuarial Examinations

Students interested in actuarial sciences should follow the APMS degree plan. Business, economics, finance and accounting courses should be taken as free electives. Interested students should talk to Mrs. Heather Ramsey.

Actuaries take a series of examinations, prior to and during employment. Students should take as many exams as possible prior to graduation. Notices of exam dates as well as applications and study materials are available in the Undergraduate Program Office. An *Introduction to Actuarial Science*, Math 419, is also offered each semester for 2 credit hours.

Exam P	Probability
Exam FM	Financial Mathematics
Exam MFE	Models for Financial Economics
Exam MLC	Models for Life Contingencies
Exam C	Construction and Evaluation of Actuarial Models

Scholarships and Financial Aid

The Mathematics Department offers some undergraduate scholarships for mathematics majors. Continuing students may apply for Math scholarships by selecting "College of Science" on this website: https://sfaid.tamu.edu/UWideApp/. Other forms of financial aid and work study programs are available from the Office of Student Financial Aid, located in the Pavilion.

The Cooperative Education Program

Students can improve their resume and earn extra money by participating in the University's Co-op Program. Although Co-op participation will delay graduation, it provides valuable work experience. Co-op students earn an average of 65 to 85 percent of the salary paid to someone with an undergraduate degree in mathematics. In addition, students who participate in Co-op often receive a 10 to 15 percent higher starting salary than students without Co-op experience. The following companies have shown interest in hiring mathematics majors through the Co-op program:

> Bureau of Labor and Statistics, Census Bureau, CIA, Air Force, IBM, National Security Agency, Naval Research Lab, Department of Commerce, UNISYS, E-Systems, General Dynamics, Advanced Micro Devices, Jet Propulsion Lab, Lockheed Martin

Most of these companies prefer students with a 3.0 or better GPA. Students interested in obtaining more information should contact the Co-op Office located on the second floor of the Koldus Building, or call 845-7725.

Honors and University Research Program

The Honors and University Research Program is not a separate degree program. Many University departments offer honors sections of regularly scheduled courses. Honors sections have limited enrollments and are reserved for the most successful and motivated students. In addition to Honors courses offered at Texas A&M, students can receive Honors credit through graduate course work, Honors Contracting, and Honors Independent Study. More information can be obtained from the Honors Program Office on the second floor of Henderson Hall.

Mathematical Association of America, Association for Women in Mathematics, and Pi Mu Epsilon

The Texas A&M Math Department has student chapters of these two national mathematics organizations. These organizations attempt to educate students about math outside their typical coursework and to give them an understanding of possible careers in math and math-related fields.

Texas A&M's MAA student chapter is open to all students who have an interest in mathematics. There are no scholastic requirements such as class standing or grade point average. Students from any major are welcome to join. The cost of membership ranges from $20 to $30.

The Association for Women in Mathematics (AWM) student chapter is open to all students, men and women, who wish to promote full participation in mathematics by women. There are no scholastic requirements such as classification or grade point average to join. Students from any major are welcome to join. AWM is free for our AWM chapter members, which are any members of our math club.

Pi Mu Epsilon is an honorary mathematics organization. Students are required to meet certain requirements to join. There is a $20 lifetime membership fee. For more information about requirements, please contact Donna Hoffman at 862-4306. The three organizations share student officers and hold joint monthly meetings and events. At the meetings, speakers are invited to talk to the group. Often, prospective employers are invited to give presentations.

OPPORTUNITIES AFTER GRADUATION

Mathematics majors receive a broad education which prepares them for a wide variety of employment opportunities. Recent graduates are working as software engineers, statistical consultants, actuarial assistants, marketing consultants, forensic assistants and teachers. There is currently a growing demand for software design and support personnel. There are also many companies and government offices which need statisticians to manage data and to implement various types of quality control. Insurance companies employ a number of our graduates as actuarial assistants. Students seeking jobs outside of academics should combine required courses in mathematics with carefully chosen electives in business, accounting, finance, economics, computer science, statistics and technical writing. The Undergraduate Program Office can provide assistance with elective course selection.

Employment Search

The Texas A&M University Career Center helps juniors and seniors find prospective employers. In recent years, approximately 35 companies have recruited mathematics majors through the Career Center. Some of these companies include Aon Hewitt, Mercer, Fidelity, Towers Watson, EY, Milliman, Schlumberger, CGG Veritas, IBM, Texas Instruments, General Motors, and Shell Oil Company. U.S. government agencies such as the CIA, the FBI, the Army, the Air Force, and NSA also interview through the Career Center. For more information, please contact the Career Center Office, Suite 209 of the Koldus Building, or call 845-5139.

Graduate School

An undergraduate degree in mathematics is an excellent background for graduate studies in mathematics, computer science, statistics, industrial engineering, and business as well as many other fields. Graduate students usually receive financial support in the form of scholarships, fellowships, industrial internships or teaching assistantships.

Students interested in graduate school should begin applying for admission and take the GRE (Graduate Records Examination) two semesters prior to graduation. Students planning to take the GRE at Texas A&M should register online at: http://www.tamu.edu/mars/testingsite/PDFfiles/GRE.pdf

at least 30 days prior to the exam date. Further information can be obtained by contacting the GRE Board at 1-800-GRE-CALL (1-800-473-2255).

The American Mathematical Society publishes a list of graduate programs and information associated with graduate assistantships and fellowships in the mathematical sciences each fall.

Information on Graduate School in Mathematics at Texas A&M University is available through the Graduate Program Office located in Blocker 227B. Information on Graduate School in Statistics at Texas A&M University is available in the Statistics Office located in Blocker 447.

$e^{e^{e^e}}$ That's all folks!