**UCLA** College Physical Sciences Mathematics

# **UNDERGRADUATE HANDBOOK**







### **6356 MATH SCIENCES**

310-206-1286 WWW.MATH.UCLA.EDU/UGRAD UGRAD@MATH.UCLA.EDU



### **Student Services**

The Student Services Office is open to answer your questions regarding —

- Academic Difficulty
- Course Planning
- Career Planning
- Course Transfers

#### **Student Services Office**

6356 Math Science Building (310) 206 - 1286

#### **Undergraduate Math Advisors**

Connie Jung Lucia Saavedra Aileen Tong

#### **Hours of Operation**

Monday - Friday 8:00 am - 11:50 am 1:00 pm - 5:00 pm

- Departmental Programs
- Enrollment Concerns
- Majors and Specializations
- Student Organizations

Website www.math.ucla.edu/ugrad

Message Center Access through MyUCLA www.my.ucla.edu

Email ugrad@math.ucla.edu

#### **Mailing Address**

UCLA Department of Mathematics 520 Portola Plaza Box #951555 Los Angeles, CA 90095-1555

### **Academic Advising Schedule**

#### Week 0 - 2

Drop-in Advising\* Priority given to enrollment issues

Monday – Friday 9:00 am – 11:50 am 1:00 pm – 4:00 pm Week 3 - Finals

Drop-in Advising\*

Monday – Friday 9:00 am – 11:50 am 1:00 pm – 4:00 pm

\*Drop-in times vary. Please contact the office at (310) 206-1286 or stop by MS 6356 to confirm hours.

### 1. Who should I go to regarding my GE or university requirements?

Questions regarding university or college requirements should be directed to the student's designated college counseling office (College of Letters and Science, Honors, AAP or Athletics). For more information, refer to their website.

http://www.registrar.ucla.edu/Academics/Academic-Counseling

# 2. Where can I obtain information about courses offered through other departments (non Math/PIC courses)?

For questions in regards to non Math/PIC course syllabus, prerequisites, enrollment restrictions, transferability, etc., students should check with the department that offers the course. The Mathematics Department does not have control over enrollment in courses outside of math and PIC.

### 3. Do I need to take the Math Diagnostic Test?

All students wishing to enroll in Math 1, Math 3A or Math 31A are required to take a math placement test. For Summer 2017, this may be either the longstanding proctored Math Diagnostic Test (MDT), or the online ALEKS PPL test. The MDT is free whereas a subscription to ALEKS PPL costs \$25. ALEKS PPL, to be used exclusively after Fall 2017, is an artificial intelligence program that poses learning problems for you based on your performance on their test. It is taken up to **three (3) times** before enrollment placement is determined. The first time is to get used to the program, the second time is the first real test to be taken as soon as possible, and the third one is to be taken (if needed) just before enrollment begins after you have improved your skills as much as possible. Details concerning the math placement are on the departmental webpage.

All students who take the MDT or ALEKS PPL and place into Math 1, but not Math 3A or Math 31A, have the opportunity to use the ALEKS PPL to place into a special 5.0 unit calculus class, Math 31AL, which will incorporate pre-calculus strengthening work into its structure.

Please contact the Student Services Office if you are not sure whether you need to take the exam.

### 4. Can I retake the Math Diagnostic Test? How often is the test offered?

Yes. Students are only allowed **two (2) attempts** on the diagnostic exam per term. The second score, for better or worse, will be placed into the student's record. The test and makeup exam are given during specific periods of time. Refer to our website for specific exam times and locations. If students are unable to reach a desired score after the retake, students will have to wait until the next quarter the exam is offered to take the test again.

www.math.ucla.edu/ugrad/diag-testdates

### 5. If I took an AP Calculus exam, what math course should I enroll in at UCLA?

Only students that receive a score of 3, 4 or 5 on the AP Calculus AB or BC exams will receive college credit. Credit may vary depending on your major and the college you belong to. Math majors will receive the credit as indicated in the following chart:

Score	AB Exam	BC Exam
5	Credit for Math 31A Enroll in Math 31B/3B	Credit for Math 31A, 31B Enroll in Math 32A/3C
4	Credit for 4 units of calculus	Credit for Math 31A and 4 units of calculus Enroll in Math 31B/3B
3	Credit for 4 units of calculus	Credit for 8 units of calculus
2	No college credit	No college credit
1	No college credit	No college credit

### **UCLA Course Credit for AP Calculus Test**

### 6. What credit will I receive with my International Baccalaureate (IB) Higher Level Exam?

UCLA awards college credit for higher level (HL) exams only. Credit awarded by UCLA as a result of IB exams is subject to change without notice. Course descriptions for each IB subject are reviewed by UCLA on a yearly basis. IB examinations, AP examinations, and college courses taken prior to or after enrolling at UCLA may be duplicative. In these cases students will be awarded credit for only one.

A score of 5-7 on the IB higher level Math test will grant students 4.0 units of Math 1 and credit for 4.0 units of calculus only. Consult with the Undergraduate Admission Office for more information. Credit may vary depending on your major and the college you belong to. www.admission.ucla.edu/Prospect/IBCreditLS.htm www.admission.ucla.edu

### 7. Does my Advanced Level General Certificate of Education, commonly referred to as an A-Level exam, count for anything?

Credit awarded by UCLA as a result of A-Level exams is subject to change without notice. In order to receive credit for math equivalences, the A-Level exams must be passed with "C" grades or better. Credit may vary depending on your major and the college you belong to. Consult with the Undergraduate Admission Office for more information.

www.admission.ucla.edu

	A	В	С
Pure Mathematics 1 (P1) + Pure Mathematics 3 (P3) + Mechanics 1 (M1) + Probability and Statistics 1 (S1)	Math 1, Math 31A	Math 1, Math 31A	Math 1
Pure Mathematics 1 (P1) + Pure Mathematics 3 (P3) + Mechanics 1 (M1) + Mechanics 2 (M2)	Math 1, Math 31A	Math 1, Math 31A	Math 1
Pure Mathematics 1 (P1) + Pure Mathematics 3 (P3) + Probability and Statistics 1 (S1) + Probability and Statistics 2 (S2)	Math 1, Math 31A	Math 1, Math 31A	Math 1

### **Possible UCLA Course Credit for CIE A-Level Exams**

#### Possible UCLA Course Credit for Singapore A-Level Exams

	Α	В	С
Higher 2 Mathematics: (P1) + (P2)	Math 1, Math 31A	Math 1, Math 31A	Math 1

### Possible UCLA Course Credit for Edexcel A-Level Exams

	А	В	С
GCE Mathematics (9371): C1, C2, C3, C4	Math 1, Math 31A	Math 1, Math 31A	Math 1
GCE Further Mathematics (9372): FP1 and FP2	12.0 title units	12.0 title units	12.0 title units
GCE Further Mathematics (9372): FP1 and FP3	12.0 title units	12.0 title units	12.0 title units
GCE Pure Mathematics (9373): C1, C2, C3, C4, FP1	Math 1, Math 31A	Math 1, Math 31A	Math 1

References:

CIE A-Level Mathematics (9709):

www.cie.org.uk/programmes-and-qualifications/cambridge-international-as-and-a-level-mathematics-9709

CIE A-Level Mathematics - Further (9231):

www.cie.org.uk/programmes-and-qualifications/cambridge-international-as-and-a-level-mathematics-further-9231 Singapore A-Level:

http://www.seab.gov.sg/pages/nationalExaminations/GAL/School\_Candidates/syllabus.asp

Edexcel A-Level:

https://qualifications.pearson.com/en/qualifications/edexcel-a-levels/mathematics-2008.html#tab-Studying

#### 8. What is a typical course load for math students?

All math majors should be taking at least one math class per quarter for the first two years. By their junior year, students should be taking two to three major courses per quarter. These are just recommendations. Schedules and course load will vary depending on students' interests and level.

#### 9. How big are the math courses?

Lower division courses usually have a capacity of 210 students in each the lecture (35 students per discussion). Upper division courses usually have a capacity of 40 students in each lecture.

### 10. What if a math course I planned to take is full during my enrollment appointment?

If there are any open sections of that course offered at a different time, it is best to try to rearrange your schedule and enroll in the open section. Otherwise, you should add yourself to the waitlist. If both the course and waitlist are full, you can continue to check the enrollment numbers and try to add yourself to the waitlist if space becomes available.

Upper division math courses are restricted to math majors and minors during first pass. Students in a math pre-major are not able to enroll in upper division math courses during first pass. Enrollment is open to all students during second pass, with a few exceptions in certain specialized courses.

For upper division math courses only, you can place your name on the unofficial waitlist. The unofficial waitlist opens on the first day of class. There are no guarantees on this unofficial waitlist - Permission to Enroll numbers will be given out by priority when the class enrollment falls below its maximum. www.math.ucla.edu/ugrad/unofficial-waitlist

If you are not enrolled in the class by the first day of instruction, you can stop by MS 6356 or email ugrad@math.ucla.edu for more information. It is always a good idea to have a back-up plan, as enrollment in any course is not guaranteed and you may have to take the course the next time it is offered.

### 11. Can I take a "Preparation for the Major" or "Major" course pass/no pass?

No. All required courses for the major, minor, or specialization must be taken for a letter grade.

### 12. If I received a "C-" or lower in my math class, may I repeat it?

For lower-division mathematics courses, students may not take or repeat a course for credit if it is a requisite for a more advanced lower-division course for which they already have credit. This applies in particular to the repetition of courses (e.g., if students wish to repeat Mathematics 31B, they must do so before completing course 32B; if students wish to repeat Mathematics 3B or 31B or 32A, they must do so before completing course 33A).

For upper-division mathematics courses, students may not take or repeat a lower sequence course for credit if it is part of a sequence for which they already have credit. This applies in particular to the repetition of courses (e.g., if students wish to repeat Mathematics 131A, they must do so before completing course 131B or 131BH).

Students may not receive credit for both a course and the honors version of that course (e.g., they may not receive credit for both Mathematics 131A and 131AH). In addition, please refer to the College of Letters and Science website at for more information about regulations/rules for repeating courses.

#### 13. How and when may I drop a course?

College of Letters and Science Drop Period	Туре	Method	Fee	Transcript Notation
Weeks 1-2 All Courses	Drop	URSA	No fee	No transcript notation
Weeks 3-4 Non-impacted Courses	Drop	URSA	\$5	No transcript notation
Weeks 3-10 Impacted Courses	Late Drop	Petition*	\$20	Transcript notation
Weeks 5-7 Non-impacted Courses	Late Drop	URSA	\$20	Transcript notation
Weeks 8-10 Non-impacted Courses	Restricted Drop (maximum 3 drops)	Petition*	\$35	Transcript notation
After week 10	Retroactive Drop	Petition*	\$50	Transcript notation

\*Petitions are available in Murphy Hall A-316

### Warning:

- If you are on financial aid and plan to drop a course, you should also speak with the Financial Aid Office to find out the consequences of your actions. www.financialaid.ucla.edu
- International students should first visit the Dashew Center first before dropping below 12.0 units. www.internationalcenter.ucla.edu

### 14. How can I find a tutor?

The following are some of the most frequently used tutoring services on campus:

**The Student Math Center** in MS 3974 offers individual and group homework assistance for lower division math courses. Hours of operation are available on the department website. www.math.ucla.edu/ugrad/smc

**The Academic Advancement Program (AAP)** in Campbell Hall 1232 offers free tutoring for lower division math and sciences courses to students whose academic profiles and personal backgrounds may impact their university experience, their retention and graduation from UCLA. To determine your eligibility, visit their office or refer to their website. www.aap.ucla.edu

**Engineering and Mathematical Sciences Library (EMS)** in Boelter Hall 8270 offers various academic resources to current UCLA students. For more information, visit their website. www.library.ucla.edu/libraries/sel/science-engineering-library

**Private (Fee Based) Tutoring** is available from graduate students in the Mathematics Department. Refer to our website for a list of available tutors. For price rates, please contact the tutors directly. www.math.ucla.edu/people/tutors

More tutoring resources can be viewed on our website at www.math.ucla.edu/ugrad/tutoring.

#### 15. Can I take courses for my major at another school?

Yes. If you would like to complete some "Preparation for the Major" or "Major" courses during the summer at a community college, four-year university, or at another UC campus, you must verify course equivalencies with an undergraduate math advisor prior to completing the course. Also, please check with your college counselor regarding residency requirements and other regulations for taking courses at another school.

Upon completion of the course(s), send an official transcript to UCLA Undergraduate Admission, 1147 Murphy Hall, Box 951436, Los Angeles, CA 90095-1436. You must also fill out a Transfer Credit Evaluation Request form in order to have the course evaluated and credited to your record.

### 16. Will the grade for a course taken at another institution transfer to UCLA?

While credit for courses taken at other schools may be used for satisfying pre-major and major requirements, grades themselves are transferred to your UCLA transcript only for courses taken at other UC campuses and Education Abroad Programs (EAP). However, grades taken at UC Extension programs do not transfer, except for those earned in Concurrent Enrollment (XLC) classes in UCLA Extension.

# 17. If I want to study abroad, how can I find out if the math courses I plan on taking will count towards my major

Students should consult with the undergraduate math advisor only after they have met with EAP and know which math courses they are considering. Bring program information, course descriptions and outlines when you meet with the undergraduate math advisor.

### 18. When and where may I petition to change or declare my major?

Students can apply for any of the pre-majors as long as they are in good academic standing and will not go over their unit max if they are accepted into the major.

Students can petition to be in any math major as long as they meet the minimum requirements to enter the major, have not exceeded 160.0 units minus the AP or other units awarded on entry, complete the mathematics sequenced courses with "C's" or better, have a GPA of 2.5 (2.7 for Math-Econ) or higher, and have no more than two repeats.

Additional economics preparation courses are required for the Mathematics/Economics and the Financial Actuarial Mathematics major where students can only have one repeat. Please refer to the department's website for further information on requirements.

catalog.registrar.ucla.edu www.math.ucla.edu/ugrad/majors

### 19. Can I double major?

The university requires students who want to double major to complete all the preparation for the major in both majors and two upper division courses in each major before applying. Please start by meeting with the undergraduate math advisor in MS 6356. If you are looking to switch to a different major outside of the Mathematics Department, please consult with the advisor for that specific department.

### 20. Can I declare more than one type of math major?

No. Additionally, students cannot declare a math major and math minor, or Mathematics/Economics and any economics major.

### 21. How do I add the Specialization in Computing?

If you are in any math major (except Mathematics of Computation), you can submit a petition to MS 6356 upon completion of PIC 10B with a grade of "C-" or better. If at any time you wish to drop the specialization, you must submit a petition requesting that it be removed.

### 22. What other major or minor options are available if I decide to not be a math major?

There are two interdepartmental programs with the Mathematics Department that are run by other departments:

- Mathematics/Atmospheric and Oceanic Sciences in the Department of Atmospheric and Oceanic Sciences Department
   www.atmos.ucla.edu/students/undergraduate/math-aos-joint-program
- **Computational and Systems Biology** in the Life Sciences Division www.casb.ucla.edu

There are two minors in the Mathematics Department:

- Mathematics minor
- Teaching Secondary Mathematics minor

# 23. What is the difference between a Mathematics/Economics and an Economics or Business Economics major?

Mathematics/Economics students receive a Bachelors of Science degree and are under the Mathematics Department major requirements. About half of the required major courses for the Mathematics/ Economics degree are in Mathematics and about half are in Economics. The program is designed to give students a solid foundation in both mathematics and economics, stressing those areas of mathematics that are most relevant to economics and the parts of economics that emphasize the use of advanced mathematics.

### **Credit Limitations**

#### Credit is given for only one course in each of the following groups:

- Mathematics 3A, 31A
- Mathematics 3B, 31B
- Mathematics #, #H
- Mathematics 110A, 117
- Mathematics 174A, 174E

You may not take a mathematics course for credit if you have credit for a more advanced course that has the first course as a prerequisite. This applies in particular to the repetition of courses. For example, if you wish to repeat 31B, you must do so before completing Math 32B. However, you are allowed to repeat 31B after completing 32A, since 31B is not a prerequisite for 32A.

You may not receive credit for both a course and for the honors version of the course (e.g., you may not receive credit for both Math 131A and Math 131AH). Math 110A, Math 110B and Math 110AH, Math 110BH (Honors) are a special case. Please see an undergraduate advisor in the Mathematics Department if you find that you have stopped in the middle of one of the algebra sequences and want to finish with the other the following year.

You may not receive credit for	If you have already taken
Mathematics 2	ANY Mathematics #106-199
Mathematics 132	Physics 132
Mathematics 151A	Electrical Engineering 133A
Mathematics 167	Economics 106G
Mathematics 170A	Statistics 100A or Electrical Engineering 131A
Mathematics 174A or Math 174E	Economics 141 or Statistics C183/283
Mathematics 182	Computer Science 180

### **Majors in Mathematics**

<b>Mathematics</b> Pure Math	This major is a good choice for students who wish to have a strong foundation in mathematics itself, independent of applications. It is taken by students who are considering graduate level mathematics training, and is a natural choice for someone interested in a career in research and/or higher education teaching.				
Applied Mathematics	Many different companies are interested in hiring applied mathematics graduates, including aerospace, financial companies, computer companies, and other technology-based industries. Students majoring in applied mathematics may also pursue graduate studies.				
Financial Actuarial Mathematics	There are few actuarial programs on the West Coast, partly because actuarial instruction requires special expertise. The specialty content in UCLA's large program is provided by professional actuaries. Overall, the major prepares students for the actuarial field by providing foundations i mathematics, economics, and finance. Students who graduate with this degree have a solid, quantitatively-oriented background which is exceller for employment in the actuarial field and in other fields such as economics, finance, applied mathematics and statistics.				
Mathematics of Computation	Students following this major take mathematics courses which are related to computer science and three upper division Computer Science courses, which are generally reserved for CS majors only. They are often later hired as CS engineers, but have the flexibility to pursue other computer-related fields. Mathematics of Computation majors have also done graduate degrees in Computer Science and Applied Mathematics.				
Mathematics/ Applied Science Three plans available	<ul> <li>a) Individual — Allows students to combine upper division math with upper division course from other science areas (i.e., physics, chemistry, physiology, etc.).*</li> <li>b) History of Science — For students intending to go to professional school, law or business, while pursuing their interest in mathematics.</li> <li>c) Medical and Life Sciences — Prepares students for a career in the medical field while pursuing their interest in mathematics. Several courses overlap with the pre-med requirements.</li> </ul>				
Mathematics for Teaching	Geared toward individuals interested in teaching mathematics at the high school or middle school level. The program aligns with the guidelines established by the state to produce more qualified teachers.				
Mathematics/ Economics	This interdepartmental major is great preparation for graduate level Economics, MBA and Financial Mathematics programs. Governments, as well as banks and other institutions of the financial industry, find its students to be good prospective employees.				

\*This major requires departmental approval and is rarely granted because the Department already offers a wide range of majors.

### MATHEMATICS

**Pre-major (10 courses):** can declare at any time when student is in good academic standing

	Quarter	Grade		Quarter	Grade
Math 31A*			Two courses from the f	following:	
Math 31B*			Econ 11		
Math 32A*			Chem 20A		
Math 32B*			Chem 20B		
Math 33A*			Life Sci 7A		
Math 33B*			Physics 1B <u>or</u> 5B		
PIC 10A			Physics 1C <u>or</u> 5C		
Physics 1A			Philos 31		
			Philos 132		

The Major (12 courses): must be declared before 160.0 units (minus AP)

Math 115A <sup>+</sup>	 
Math 131A <sup>+</sup>	 
Math 110A	 
Math 110B	 
Math 120A	 
Math 131B	 
Math 132	

Five upper division mathematics courses chosen from: Math 106 - 199, Stats 100A - 102C

1	 	
2	 	
3	 	
4	 	
5	 	

\*The mathematics sequenced courses are calculated separately from the other preparation for the major courses and must be completed with a minimum overall 2.5 grade-point average and a grade of "C" or better in each course. Repetition of more than two mathematics sequenced courses, or of any mathematics sequenced course more than once, results in automatic dismissal from the major.

+ "C-" or better. It is strongly recommended that students take Math 115A as one of their first upper division courses before Math 131A.

### **APPLIED MATHEMATICS**

**Pre-major (10 courses):** can declare at any time when student is in good academic standing

Quarter         Grade         Quarter         Grade           Math 31A*          Physics 1A				-	-	
Math 31A*		Quarter	Grade		Quarter	Grade
Math 318*        Physics 18	Math 31A*			Physics 1A		
Math 32A*	Math 31B*			Physics 1B		
Math 328*        One course from the following:         Math 33A*        Chem 20A          Math 33B*        Chem 20B          PIC 10A        Physics 1C          The Major (12 courses):       must be declared before 160.0 units (minus AP)	Math 32A*					
Math 33A*	Math 32B*			One course from the	following:	
Math 33B*        Chem 20B	Math 33A*			Chem 20A		
PIC 10A        Physics 1C	Math 33B*			Chem 20B		
The Major (12 courses): must be declared before 160.0 units (minus AP)     Math 115A*   Math 131A*   Math 131B or 132   Math 131B or 132   Math 142   Two 2-quarter sequences chosen from three different categories: A. Differential Equations:   Math 134   Math 135   B. Applied Numerical Methods:   Math 151A   Math 151B   C. Probability and Statistics:     Math 170A   and   Math 170B   Or   Four upper division mathematics courses chosen from: Math 106 - 199, Stats 100A - 102C	PIC 10A			Physics 1C		
Math 115A <sup>+</sup> Math 131A <sup>+</sup> Math 131B or 132 Math 142 Two 2-quarter sequences chosen from three different categories: A. Differential Equations: Math 134 Math 135 B. Applied Numerical Methods: Math 151A C. Probability and Statistics: Math 151B C. Probability and Statistics: Math 151B Stats 100A Math 151B Def Stats 100A Stats 100B Four upper division mathematics courses chosen from: Math 106 - 199, Stats 100A - 102C	<u>The Major (12 co</u>	<b>urses):</b> must be	declared befo	ore 160.0 units (minus AP)		
Math 131A <sup>+</sup>	Math 115 $A^+$					
Math 131B or 132	Math 131 $A^+$					
Math 142	Math 131B <u>or</u> 132					
Two 2-quarter sequences chosen from three different categories:       A. Differential Equations:         A. Differential Equations:       Math 134         Math 135	Math 142					
Math 134 B. Applied Numerical Methods: Math 135 Math 151A Math 151B Math 151B Math 151B Math 170A <b>or</b> Stats 100A Stats 100B Four upper division mathematics courses chosen from: Math 106 - 199, Stats 100A - 102C	<b>Two</b> 2-quarter seq A. Different	luences chosen tial Equations:	from three di	fferent categories:		
B. Applied Numerical Methods: Math 135 Math 151A Math 151B Math 151B Math 151B Math 151B Math 151B Math 170A Math 170A Stats 100A Math 170B Stats 100A Math 170B Math 170B Stats 100B Math 106 - 199, Stats 100A - 102C				Math 134		
B. Applied Numerical Methods: Math 151A Math 151B Math 151B Math 151B Math 151B Math 170A Math 170A Stats 100A Math 170B Stats 100A Math 170B Math 170B Math 106 - 199, Stats 100A - 102C				Math 135		
Math 151A Math 151A Math 151B Math 151B Math 151B Math 151B Math 170A Stats 100A Math 170B Stats 100A Math 170B Math 170B Math 106 - 199, Stats 100A - 102C	B. Applied	Numerical Meth	nods:	Math 151A		
C. Probability and Statistics: Math 170A <u>and</u> Math 170B <u>or</u> <u>and</u> Stats 100A <u>and</u> Stats 100B <u>and</u> Stats 100B <u>and</u> Stats 100A <u>and</u> Stats 100A <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> Stats 100A <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u> <u>and</u>				Math 151A		
Math 170A       or       Stats 100A          and       or       and          Math 170B       or       and          Stats 100B            Four upper division mathematics courses chosen from: Math 106 - 199, Stats 100A - 102C	C. Probabil	ity and Statistic	5:	Math 151B		
and Math 170Bor and Stats 100BFour upper division mathematics courses chosen from: Math 106 - 199, Stats 100A - 102C		Ma	th 170A	Stats 100A		
<b>Four</b> upper division mathematics courses chosen from: Math 106 - 199, Stats 100A - 102C		Ma	and o th 170B	r <u>and</u> Stats 100B		
	Four upper divisio	n mathematics	courses chose	en from: Math 106 - 199, S	Stats 100A - 102C	



\*The mathematics sequenced courses are calculated separately from the other preparation for the major courses and must be completed with a minimum overall 2.5 grade-point average and a grade of "C" or better in each course. Repetition of more than two mathematics sequenced courses, or of any mathematics sequenced course more than once, results in automatic dismissal from the major.

+ "C-" or better. It is strongly recommended that students take Math 115A as one of their first upper division courses before Math 131A.

### FINANCIAL ACTUARIAL MATHEMATICS

<u>Pre-major (12 c</u>	ourses): can decl	are at any tim	e when student is in good ac	ademic standing	
	Quarter	Grade		Quarter	Grade
Math 31A*			Math 32B*		
Math 31B*			Math 33A*		
Math 32A*			Math 33B*		
PIC 10A*					
Econ 1**			Mgmt 1A**		
Econ 2**			Mgmt 1B**		
Econ 11**					
<u>The Major (11 c</u>	<b>ourses):</b> must be	e declared befo	ore 160.0 units (minus AP)		
Math 115 $A^+$					
Math $131A^+$					
Math 170A					
Math 170B					
Math 175					
Math 174A ( <u>or</u> M	1ath 174E <u>or</u> Ecoi	n 141 <u>or</u> Stats	C183/283)		
<b>One</b> two-quarter A.) Life Co M	r actuarial sequer ontingency Actua lath 172B	ice chosen fro irial Models:	m two different categories:		
Μ	lath 172C				
B.) Casua M	lty Loss Models: Iath 173A				
М	lath 173B				
<u><b>Three</b></u> upper divi was not taken fo	sion <u>Actuarial, E</u> r the two-term se	<b>conomics or</b> (	<b><u>Statistics</u></b> courses: Math 172E n 101 – 199B, Stats 100C	3 – Math 173B (wh	ichever

1	· "		
2		 	
3		 	

\*(Mathematics sequenced courses), \*\* (Economics preparation courses): Each are calculated separately and must be completed with a minimum overall 2.5 grade-point average and a grade of "C" or better in each course. Repetition of more than two mathematics sequenced courses, or of any mathematics sequenced course more than once, results in automatic dismissal from the major. Repetition of more than one economics preparation course, or of any economics preparation course more than once, results in automatic dismissal from the major.

+ "C-" or better. It is strongly recommended that students take Math 115A as one of their first upper division courses before Math 131A.

### **MATHEMATICS OF COMPUTATION**

Pre-major (13 cou	<u>rses):</u> can decl	are at any tim	e when student is in good ac	cademic standing	
	Quarter	Grade		Quarter	Grade
Math 31A*			PIC 10A		
Math 31B*			PIC 10B		
Math 32A*			PIC 10C		
Math 32B*					
Math 33A*					
Math 33B*			One course from the fo	llowing:	
Math 61			Chem 20A		
Physics 1A			Chem 20B		
Physics 1B			Physics 1C		
The Major (14 cou	i <b>rses):</b> must be	declared befo	ore 160.0 units (minus AP)		
Math 115 $A^+$					
Math 131A $^{+}$					
Math 131B <u>or</u> 132					
Math 151A					
Math 151B					
<b>Six</b> upper division r	mathematics co	ourses chosen	from: Math 106 - 199, Stats	100A - 101C	
1					
2					
3					
4					
5					
6					
Three upper divisio	on <u>Computer S</u>	<u>cience</u> course	25:		
1					
2					
3					

\*The mathematics sequenced courses are calculated separately from the other preparation for the major courses and must be completed with a minimum overall 2.5 grade-point average and a grade of "C" or better in each course. Repetition of more than two mathematics sequenced courses, or of any mathematics sequenced course more than once, results in automatic dismissal from the major.

+ "C-" or better. It is strongly recommended that students take Math 115A as one of their first upper division courses before Math 131A.

CS courses at UCLA are acceptable substitutions for PIC: CS 31 = PIC 10A, CS 32= PIC 10B, (CS 33 AND CS 35L) = PIC 10C. For help with enrollment in or information of CS courses, contact HSSEAS since all CS courses are restricted to HSSEAS students.

### **INDIVIDUAL PLAN**

#### Under the Mathematics/Applied Science major

Pre-major (7 courses): can declare at any time when student is in good academic standing

		<b>•</b> •					
		Quarter	Grade			Quarter	Grade
Math 31A*				Math 33A*			
Math 31B*				Math 33B*			
Math 32A*				PIC 10A*			
Math 32B*							
<u>The Major (</u>	14 course	<b>s):</b> must be	e declared before	160.0 units (r	ninus AP)		
<u>Seven</u> upper	division r	nathematio	cs courses choser	from: Math 1	.06 – 199:		
1. Ma	th 115 $A^+$						
2. Ma	th 131A⁺						
3							
4						_	
5.							
One 2-quarte	er mathen	natics sequ	ience:				
6							
7							
Savan upper	division c	ourses cho	sen from 1 - 2 re	lated fields:			
Dopartme	unision c	Jourses chi		Dopartm	ont:		
C	T'U			C	T'U		
Course	litle		Quarter Grade	Lourse	litle	Quartei	r Grade
1 2.				1 2.			
3				3			
4				4	. <u> </u>		
5 6				5 6			
0 7.				0 7.	·		
I understand t	that if I wisl	n to make a	ny changes to my I	ndividual Plan,	I must first obta	in written approv	al from
the Student S	ervices Offi	ce in MS 63	56.				
Student's Sigr	nature					Date	

Undergraduate Vice-Chair's Signature

Date \_\_\_\_\_

\*The mathematics sequenced courses are calculated separately from the other preparation for the major courses and must be completed with a minimum overall 2.5 grade-point average and a grade of "C" or better in each course. Repetition of more than two mathematics sequenced courses, or of any mathematics sequenced course more than once, results in automatic dismissal from the major.

+ "C-" or better. It is strongly recommended that students take Math 115A as one of their first upper division courses before Math 131A.

### **HISTORY OF SCIENCE PLAN**

#### Under the Mathematics/Applied Science major

Pre-major (10 cour	<u>ses):</u> can decl	are at any time	e when student is in good acade	emic standing	
	Quarter	Grade		Quarter	Grade
Math 31A*			Three courses from the folle	owing <sup>1</sup> :	
Math 31B*			Hist 2B		
Math 32A*			Hist 2C		
Math 32B*			Hist 3A		
Math 33A*			Hist 3B		
Math 33B*			Hist 3C		
PIC 10A			Hist 3D		
<u>The Major (14 cour</u>	<b>ses):</b> must be	declared befo	re 160.0 units (minus AP)		
Math 115 $A^+$			Math 106		
Math $131A^+$			Math 134		
			Math 170A		
Three upper divisior	n mathematics	s courses chose	en from: Math 110A - 199		
1					
2					
3					
<u><b>Six</b></u> upper division <u>H</u>	istory, Philos	ophy or Phys	ical Science courses:		
Five upper division of	courses from t	he following <sup>1</sup> :			
Hist 179A	History of N	ledicine: Histo	ric roots of Healing Arts		
Hist 179B	History of N	ledicine: Foun	dations of Modern Medicine		
Hist 180A	Topics in Hi	story of Scienc	ce		
Hist M180B	Historical P	erspectives on	Gender and Science		
Hist 180C	Science and	l Technology ir	n the 20th Century		
Philos 124	Philosophy	of Science: His	torical		
One Honors Colleg	<u>ium</u> course w	ith "history of s	science or medicine" content <sup>1</sup> :		
1.					

+ "C-" or better. It is strongly recommended that students take Math 115A as one of their first upper division courses before Math 131A.

<sup>1</sup>Students can petition with the Mathematics Department for other courses not on this list to fulfill the major requirements.

<sup>\*</sup>The mathematics sequenced courses are calculated separately from the other preparation for the major courses and must be completed with a minimum overall 2.5 grade-point average and a grade of "C" or better in each course. Repetition of more than two mathematics sequenced courses, or of any mathematics sequenced course more than once, results in automatic dismissal from the major.

### **MEDICAL AND LIFE SCIENCE PLAN**

### Under the Mathematics/Applied Science major

Pre-major (19 cour	<u>ses):</u> can decla	are at any time	e when student is in good	academic standing	
	Quarter	Grade		Quarter	Grade
Math 31A*			Chem 20A		
Math 31B*			Chem 20B		
Math 32A*			Chem 20L		
Math 32B*			Chem 30A		
Math 33A*			Chem 30AL		
Math 33B*			Life Sci 1		
PIC 10A			Life Sci 2		
Physics 1A			Life Sci 3		
Physics 1B			Life Sci 4		
			Life Sci 23L		
The Major (13 cour	r <b>ses):</b> must be	declared befc	ore 160.0 units (minus AP)		
Math 115A⁺			Math 151A		
Math 131A <sup>+</sup>			Math 170A		
Math 134			Math 170B		
One upper division r	mathematics o	ourse chosen	from: Math 110A - 199, St	ats 100B - 101C	
1					
<b><u>Six</u></b> upper division of	utside science	courses <sup>1</sup> :			
Phy Sci M180A	Cellular and	Systems Neu	roscience		
Phy Sci M180B	Molecular a	nd Developm	ental Neuroscience		
Phy Sci M180C Same as Molecular, Cell, and M117B-M117C	Behavioral a Developmental Bi	and Cognitive ology M175A-M17	Neuroscience 5B-M175C, Neuroscience M101A-M	101B-M101C, and Psychology	/ M117A-
Three upper divisior	n courses from	n the following	9 <sup>1</sup> :		
Biomath 160			EEB 133		
Biostat 100A			EEB C135		
Chem CM160A			Phy Sci 100		
Com Sci CM186			Phy Sci 135		
EEB C119A					

\*The mathematics sequenced courses are calculated separately from the other preparation for the major courses and must be completed with a minimum overall 2.5 grade-point average and a grade of "C" or better in each course. Repetition of more than two mathematics sequenced courses, or of any mathematics sequenced course more than once, results in automatic dismissal from the major.

+ "C-" or better. It is strongly recommended that students take Math 115A as one of their first upper division courses before Math 131A.

<sup>1</sup>Students can petition with the Mathematics Department for other courses not on this list to fulfill the major requirements.

### **MEDICAL AND LIFE SCIENCE PLAN**

### Under the Mathematics/Applied Science major

Pre-major (18 cours	<u>es):</u> can declare	e at any time w	hen student is in good acader	mic standing
	Quarter	Grade		Quarter Grad
Math 31A*			Chem 20A	
Math 31B*			Chem 20B	
Math 32A*			Chem 20L	<u> </u>
Math 32B*			Chem 30A	
Math 33A*			Chem 30AL	
Math 33B*			Life Sci 7A	
PIC 10A			Life Sci 7B	·
Physics 1A			Life Sci 7C	
Physics 1B			Life Sci 23L	
				A 46
The Major (13 cours	<b>s<u>es):</u> must be de</b>	eclared before	160.0 units (minus AP)	$\mathbf{\Lambda}\mathbf{O}$
Math 115A <sup>+</sup>			Math 151A	
Math 131 $A^+$			Math 170A	
Math 134			Math 170B	
One upper division m	nathematics cou	irse chosen fro	m: Math 110A - 199, Stats 100	OB - 101C
1				
<u><b>Six</b></u> upper division ou	tside science co	ourses <sup>1</sup> :		
Phy Sci M180A	Cellular and Sy	ystems Neuros	cience	
Phy Sci M180B	Molecular and	Development	al Neuroscience	
Phy Sci M180C Same as Molecular, Cell, and M117B-M117C	Behavioral and Developmental Biolo	d Cognitive Ne gy M175A-M175B-N	uroscience /175C, Neuroscience M101A-M101B-M1	01C, and Psychology M117A-
Three upper division	courses from th	ne following <sup>1</sup> :		
Biomath 160			EEB 133	
Biostat 100A			EEB C135	
Chem CM160A			Life Sci 107	
Com Sci CM186			Phy Sci 100	

\*The mathematics sequenced courses are calculated separately from the other preparation for the major courses and must be completed with a minimum overall 2.5 grade-point average and a grade of "C" or better in each course. Repetition of more than two mathematics sequenced courses, or of any mathematics sequenced course more than once, results in automatic dismissal from the major.

+ "C-" or better. It is strongly recommended that students take Math 115A as one of their first upper division courses before Math 131A.

<sup>1</sup>Students can petition with the Mathematics Department for other courses not on this list to fulfill the major requirements.

Note: This plan is for students starting in Winter 2018 and forward.

EEB C119A

Phy Sci 135

### **MATHEMATICS FOR TEACHING**

Pre-major (11 cours	<u>es):</u> can decla Ouarter	re at any time v Grade	when student is in good acade	emic standing Ouarter	Grade
Math 31A*	Quarter	Chade	Physics 1A <b>or</b> 5A	Quarter	Cruuc
Math 31B*			<b>Two</b> courses from the follo	wing:	
Math 32A*			Chem 20A	5	
Math 32B*			Chem 20B		
Math 33A*			Physic 1B <u>or</u> 5B		
Math 33B*			Physic 1C <u>or</u> 5C		
Math 61			PIC 10BC - 97:		
PIC 10A					
The Major (13 cours)         Math 115A <sup>+</sup> Math 131A <sup>+</sup> Math 105A         Math 105B         Math 105C         Math 106	<u>es):</u> must be o	declared before	160.0 units (minus AP)		 
Math 117 <u>or</u> 110A					
Math 123 <u>or</u> 120A					
Math 170A <u>or</u> Stats 1	00A				
Stats 100B					
One course chosen fr	om Math 131	B - 136: Mathei	matics Analysis		
1					
One course chosen fr 1	om Math 142	- 167: Applied	Mathematics		
One course chosen fr	om Math 110	B – 191H <u>or</u> Sta	ats 100C: Upper Division Math	ematics	
1.					

**Disclaimer**: In order to receive a 100% CSET waiver from UCLA, students must have "C-" or better in the following courses and an upper division GPA of 2.0 or higher: Mathematics 117 or Mathematics 110A, Mathematics 123 or Mathematics 120A, Mathematics 131A, Mathematics 105A, Mathematics 105B, and Mathematics 105C. http://curtiscenter.math.ucla.edu/undergraduates

\*The mathematics sequenced courses are calculated separately from the other preparation for the major courses and must be completed with a minimum overall 2.5 grade-point average and a grade of "C" or better in each course. Repetition of more than two mathematics sequenced courses, or of any mathematics sequenced course more than once, results in automatic dismissal from the major.

+ "C-" or better. It is strongly recommended that students take Math 115A as one of their first upper division courses before Math 131A.

### **MATHEMATICS/ECONOMICS**

Pre-major (11 c	ourses): can decl	are at any tim	e when student is in good aca	demic standing	
	Quarter	Grade		Quarter	Grade
Math 31A*			Math 33A*		
Math 31B*			Math 33B*		
Math 32A*			Math 61*		
Math 32B*			PIC 10A*		
Econ 1**			Econ 11**		
Econ 2**					
<u>The Major (14 c</u>	ourses): must be	declared befo	ore 160.0 units (minus AP)		
Math 115 $A^+$					
Math 131A $^+$					
Math 131B					
Math 164					
Math 170A					
Math 170B					
Math 174E ( <u>or</u> M	lath 174A <u>or</u> Ecor	n 141 <u>or</u> Stats	C183/C283)		
One upper divisi	on mathematics o	courses chose	n from: Math 134, Math 135, N	Math 136, Math 1	71
1					
<u><b>Six</b></u> upper divisio	n <u>Economics</u> cou	irses:			
Econ 101 <sup>+</sup>	Mici	roeconomic T	heory		
Econ 102 <sup>+</sup>	Mac	roeconomic T	Theory		
Econ 103	Intro	oduction to Ec	conometrics		
Econ 103L	Ecor	nometrics Lab	oratory		
<b>Two</b> additional u	pper division ecc	nomics cours	es chosen from: Econ 106 - 19	19	
1					
2					

+ "C-" or better. It is strongly recommended that students take Math 115A as one of their first upper division courses before Math 131A.

<sup>\*(</sup>Mathematics sequenced courses), \*\* (Economics preparation courses): Each are calculated separately and must be completed with a minimum overall 2.7 grade-point average and a grade of "C" or better in each course. Repetition of more than two mathematics sequenced courses, or of any mathematics sequenced course more than once, results in automatic dismissal from the major. Repetition of more than one economics preparation course, or of any economics preparation course more than once, results in automatic dismissal from the major.

### **SPECIALIZATION IN COMPUTING**

The Specialization in Computing is not a major, but a supplement to the Mathematics, Applied Mathematics, Financial Actuarial Mathematics, Mathematics/Applied Science, Mathematics for Teaching and Mathematics/Economics majors. It provides an extensive education in elementary computer science and an introduction to its applications in mathematics.

Students who complete the specialization will receive a notation on their diploma. Mathematics/ Economics majors interested in a Specialization in Computing must follow the specialization offered through the Mathematics Department.

- Each PIC and Math course applied to the specialization must be passed with a minimum grade of "C-" and an overall combined GPA of 2.0.
- Students planning to complete the Specialization in Computing must petition to add this program to their major after completing PIC 10B. Petitions should be filed in the Student Services Office, MS 6356.
- Students who have added the Specialization in Computing to their major and choose to graduate before completing the specialization must officially drop the program by filing a petition in MS 6356.
- Courses 180 and 182 may only be applied once to the Specialization in Computing.

#### **Required for the specialization (7 courses):**

	Quarter	Grade
PIC 10A		
PIC 10B		
<b><u>Two</u></b> PIC courses from the following:		
PIC 10C		
PIC 15		
PIC 16		
PIC 20A		
PIC 20B		
PIC 30		
PIC 40A		
PIC 60		
One mathematics course from the following:		
Math 61 <u>or</u> Math 180 <u>or</u> Math 182 <u>or</u> Math 184		
<b><u>Two</u></b> upper division mathematics courses chosen from: Math 149 - 159, 180, 182		
1		
2		

Quarter

Grado

### **MINOR IN MATHEMATICS**

The Mathematics minor is designed to provide students who are not math majors the opportunity to deepen their understanding of the role of mathematics in various disciplines.

Students planning to complete the minor in mathematics must petition to add this minor to their major after completing 12.0 units of mathematics towards the minor at UCLA. At least one of the courses taken for these 12.0 units must be an upper division course taken at UCLA. Students who have added the minor and choose to graduate before completing the minor must officially drop the minor by filing a petition in the Student Services Office, MS 6356.

Students must complete all lower division courses with grades of "C" or better. Upper division courses must have an overall grade-point average of 2.0 or better that is calculated separately from the lower division courses. A minimum of 20.0 units applied toward the Mathematics minor requirements must be in addition to units applied toward major or other minor requirements.

Note that certain standard pre-major (lower division) math courses are not required for the minor (Math 31A, Math 31B, Math 32B). Nevertheless, all upper division mathematics course prerequisites are enforced for all students.

	Quarter	Grade
Math 32A		
Math 33A		
Math 33B		
<b>Five</b> upper division mathematics courses chosen from: Math 106 – 199		
1		
2		
3		
4		
5		

Required for the minor (8 courses):

### **MINOR IN TEACHING SECONDARY MATHEMATICS**

The Teaching Secondary Mathematics minor is designed for students majoring in fields other than mathematics who plan to teach secondary mathematics after graduation. For non-majors joining the Mathematics Department and School of Education's Joint Mathematics Education Program (JMEP), the minor provides recognition for completion of prerequisite coursework for the program. The minor provides additional upper division course work in mathematics relevant to the secondary school curriculum: algebra, geometry, and analysis. This coursework also prepares students for content on the California Subject Examination for Teachers, which is required to prove competence in the subject matter. In addition, the minor provides the coursework on secondary mathematics from an advanced standpoint which is recommended by the Conference Board of Mathematical Sciences.

To enter the minor, students must have completed Mathematics 115A with a grade of "C" or better. If Mathematics 115A was not completed at UCLA, students must show proof that they completed an equivalent course with a grade of "C" or better. Students who have added the minor and choose to graduate before completing the minor must officially drop the minor by filing a petition in the Student Services Office, MS 6356.

A minimum of 20.0 units applied toward the Teaching Secondary Mathematics minor requirement must be in addition to units applied toward major or other minor requirements.

Note that even though lower division courses (Math 31A, Math 31B, Math 32A, Math 32B, Math 33A, Math 33B) are not required for the minor, please be aware of any upper division mathematics courses for which those prerequisites are enforced for all students.

<u>Required for the minor (7 courses):</u>		
	Quarter	Grade
Math 115A <sup>+</sup>		
Upper division mathematics courses with "C-'s" or higher and a minimum 2.0 up	per division GPA	٢
Math 117 <u>or</u> Math 110A		
Math 123 <u>or</u> Math 120A		
Math 131A		
Math 105A		
Math 105B		
Math 105C		

+ "C" or better. It is strongly recommended that students take Math 115A as one of their first upper division courses before Math 131A.

Note: This minor is not open to any math major.

### **Departmental Honors & Scholar**

The Mathematics Departmental Honors and Scholar Programs are two of our most rigorous programs, designed to further prepare students for graduate study.

While the Departmental Honors Program grants eligible students the opportunity to work closer with faculty and apply their learning to an original project, the Departmental Scholar Program allows students with exceptional academic records to simultaneously pursue a Bachelors and Masters degree in mathematics.



If you are interested in applying or have any questions about either of these programs, please consult with the undergraduate math advisor.

### **Admission to the Honors Program**

To be considered for admission to the **Departmental Honors Program** for any math major, a student must:

- be officially enrolled in his/her respective math major;
- have completed at least four courses at UCLA in the Mathematics Department from those required in the "Preparation for the Major" or "Major"; and
- have at least a 3.6 GPA in such mathematics courses taken at UCLA.

To be considered for admission to the Honors Program in Mathematics/Economics, a student must:

- be officially enrolled in the Mathematics/Economics major;
- have completed all of the "Preparation for the Major" courses; and
- have at least a 3.5 GPA in the "Preparation for the Major".

In addition to the requirements listed above, students must complete specific courses within the department. Please refer to our website at for more information and consult with the undergraduate math advisor. www.math.ucla.edu/ugrad/honor-programs

### **Eligibility & Timeline for the Scholar Program**

Admission to the Scholar program is based on completion of requirements and evaluation of overall performance in relevant courses. You are eligible to petition to become a Scholar after:

- Completion of at least 96.0 units;
- Completion of all "Preparation for the Major" courses;
- Completion of the entire Math 30-series courses (31AB, 32AB, 33AB); and
- Completion of Math 115AH, 115B, 131AH and 131BH.

**First year at UCLA**: Complete or have credit from another institution/standardized test (AP or IB Exams) all lower -division calculus-based courses (Math 31A, 31B, 32A, 32B, 33A, 33B). If possible, take 115AH in spring.

**Second year at UCLA**: Complete Math 115AH (Honors Linear Algebra), Math 115B (Linear Algebra), Math 131AH (Honors Analysis) and 131BH (Honors Analysis). Completion of these courses will provide a strong foundation for the Basic Qualifying Exam.

**Third Year at UCLA**: Pass the Basic Qualifying Exam. Petition to become a Scholar. Complete other courses for your particular math major. If possible, begin graduate courses as well.

Fourth year at UCLA: Complete the remaining graduate level courses for the Masters Degree.

In addition to the requirements listed above, final approval is required from College Honors and the Graduate Division. Please refer to our website for more information and consult with the undergraduate math advisor. www.math.ucla.edu/ugrad/scholar

### **Graduate School Opportunities**



Successful graduate work in mathematics requires skills in formal reasoning and in constructing rigorous mathematical proofs.

These skills are more essential for success at the graduate level than is the knowledge of any particular topic. The honors sequences will provide training in these skills to a far greater degree than the regular sequences. In fact, a typical graduate admissions committee will look more favorably upon an "A-" earned in a honors sequence than a "A", or even "A+", earned in the regular sequence.

Most applications for graduate programs in mathematics must be submitted between December and February, so it is best to contact colleges during the summer or access their websites for online applications and additional information.

Most universities will require the following materials with their applications:

- Three letters of recommendation
- GRE general and mathematics subject exams
- Personal statement

### **Recommended Courses to Prepare for Graduate School**

For Pure Mathematics	For Applied Mathematics
Math 115AH + 115B	Math 115AH + 115B
Math 131AB (Honors) + 131C	Math 131AB (Honors) +131C
Math 110AB (Honors) + 110C	Math 110AB (Honors) + 1100
Math 120A, 121	Math 132H
Math 132H	Math 133, 134, 135 and 136
Math 133, 134, 135 and 136	Math 151AB, 155, 156
	Math 170AB, 171

Please research on the graduate or professional schools you are interested in before meeting with the undergraduate math advisor for information on applying to graduate school and timelines.

For information about applying to medical or professional schools, visit the Career Center. www.career.ucla.edu

### **Research Opportunities — At UCLA**

### IPAM Research in Industrial Projects for Students (RIPS)

www.ipam.ucla.edu/programs/student-research-programs

RIPS is based on the successful Math Clinic concept that originated at Harvey Mudd College in 1973, as well as the Research Experience for Undergraduates (REU) program sponsored by the National Science Foundation (NSF). In the RIPS program, teams of students, directed by faculty advisors, work to solve industry-related problems. RIPS brings together highly qualified undergraduates in mathematics, or related majors, with sponsoring industry, government, and nonprofit organizations to collaborate on projects. Each team of three to four advanced students spends two summer months working on a problem posed by the sponsoring organization under the leadership of a faculty advisor. Projects focus on problems of serious interest to the sponsor and stimulating challenges to the students. Participation in RIPS provides valuable real-world technical and managerial experience for students and valuable R&D for the sponsor.

### UCLA NSF Research Education for Undergraduates (REU) Program

www.math.ucla.edu/~bertozzi/WORKFORCE

The REU program includes both individual research and group activities. Each student is assisted by a faculty advisor and some also by a graduate-student advisor. Group activities include seminars and other social and professional events. Students are encouraged to continue their research during the following academic year, under the direction of their summer mentor or another faculty member. Eligible students will receive a stipend for their work.

### UCLA Undergraduate Research Center (URC)

#### www.ugresearchsci.ucla.edu

The URC - Sciences serves students and faculty in all areas of life and physical sciences, engineering and mathematics. The primary mission is to promote, develop and celebrate undergraduate student research with the overall goal of enhancing undergraduate education and preparing students, including those from disadvantaged backgrounds, for academic and research careers. Research takes different forms in different disciplines. However, in all disciplines, research involves creative activities and meaningful research to produce results that are worthy of communication to others. Undergraduate research involves the close collaboration between a student and a faculty mentor, as well as other members of their research group.



Some of the programs that the URC runs through the school year and summer include, but are not limited to:

- Amgen Scholars Summer Program
- Biomedical Sciences Enrichment Program
- Bridges to UCLA for Community College Students
- CARE Fellows & Scholars Program
- CARE Science, Engineering & Math Summer Research Program

### UCLA Undergraduate Research Portal

#### www.my.ucla.edu

- Clare Boothe Luce Undergraduate Research Program
- Grand Challenges Undergraduate Research Scholars
   Program
- i<sup>2</sup>URP (formerly HHURP)
- Maximizing Access to Research Careers (MARC) Program

You can search for research opportunities in all disciplines through the Research Portal in MyUCLA. When you log in, click on "Academics" and then "Undergraduate Research Portal".

### **Research Opportunities — Off Campus**

While UCLA has many opportunities for undergraduate research, we also highly encourage students to take advantage of research opportunities from other institutions. Below are some examples of research opportunities outside of UCLA.

### National Science Foundation (NSF) REU Programs

www.nsf.gov/crssprgm/reu

NSF funds research and education in most fields of science and engineering. It does this through grants, and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the United States. The Foundation accounts for about one-fourth of federal support to academic institutions for basic research. The agency operates no laboratories itself but does support National Research Centers. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

### Science Undergraduate Laboratory Internships (SULI) science.energy.gov/wdts/suli

The SULI program encourages undergraduate students to pursue science, technology, engineering, and mathematics (STEM) careers by providing research experiences at the Department of Energy (DOE) laboratories. Selected students participate as interns appointed at one of 17 participating DOE facilities/laboratories. They perform research, under the guidance of laboratory staff scientists or engineers, on projects supporting the DOE mission. The SULI program is sponsored and managed by the DOE Office of Science's and Office of Workforce Development for Teachers and Scientists (WDTS) in collaboration with the DOE facilities/laboratories.

### DIMACS REU: Research Experience for Undergraduates at Rutgers University

#### reu.dimacs.rutgers.edu

DIMACS was founded as one of 24 Science and Technology Centers funded by the NSF. It is located at Rutgers University, and is a joint project of Rutgers, Princeton, AT&T Laboratories, Applied Communication Sciences, NEC Laboratories America, and Nokia Bell Labs. Applicants should be undergraduates with a major in Computer Science, Mathematics, or a closely related STEM field. They should be current juniors (graduating in in the fall or spring immediately following the program), although sophomores with exceptionally strong backgrounds will be considered. Freshmen who have completed advanced course work in CS or Math may apply, but they are very rarely accepted.

### MathPrograms.Org

#### www.mathprograms.org

The MathPrograms service hosts a database of undergraduate summer research programs, small travel grant programs, and various other opportunities in mathematics at institutions across the nation.

### **Career Opportunities**

Graduating with a major in mathematics from UCLA will give you the critical thinking skills that employers are seeking. Mathematics opens the door to unlimited opportunities, if you are willing to invest the time necessary to perform well. Our students have been employed by a diverse selection of companies in varying capacities.

In today's competitive world, a good education is essential. With a strong background in mathematics and logic, you give yourself the best advantage for **ANY** career you choose.

Some of the careers our students have enjoyed:

- Computer Programmer
- Financial Analyst
- Actuary
- Buyer
- Programmer Analyst
- High School Teacher
- Navy Pilot
- Management Consultant
- Cost Analyst
- Financial Planner
- Auditor
- Technical Advisor
- Accountant

And many, many more!

For more information about career opportunities please visit the Career Center online. career.ucla.edu



### **Student Organizations**



### **UCLA Bruin Actuarial Society (BAS)**

The UCLA Bruin Actuarial Society is designed for those students interested in the actuarial profession. They serve as a support group for motivated students who plan on taking actuarial exams and want to find internships and jobs in the field. They are also dedicated to informing fellow Bruins who are interested in the actuarial field. During the last year, weekly emails were sent out to club members regarding company information sessions, internships, jobs, and scholarships.

#### www.math.ucla.edu/~actuary • bruinactuaries@gmail.com



**Undergraduate Mathematics Students' Association (UMSA)** 

The UCLA Undergraduate Mathematics Students' Association is an officially recognized student group for mathematics majors, and students of the other majors, who are interested in mathematics. UMSA was established in response to students' desire to have a connection to the Mathematics Department. The purpose of UMSA is to:

- Promote the academic awareness of the mathematics major.
- Promotes better student-faculty relations.
- Provide information on career opportunities in mathematics.
- Provide a peer network in which students can discuss and further develop ideas and concepts that are presented in mathematics courses.

#### www.math.ucla.edu/~umsa • umsa@math.ucla.edu



### UCLA Pi Mu Epsilon (PME)

Pi Mu Epsilon, Inc., is the Honorary National Mathematics Society. Their purpose is "to promote scholarly activities in the mathematics among students, awareness of higher educational programs and career opportunities in mathematics, as well as social activities among its members." Current and future chapter projects include arranging popular talks on mathematical topics, a weekly problem-solving group, on-campus and off-campus community involvement (i.e., setting up high school competitions), and social activities.

www.pme-math.org • PMEinLA@gmail.com

### **Teaching Preparation Programs**

### Do you love mathematics?

Do you like to explain mathematics concepts to others?



Imagine getting to develop a deep understanding of the mathematics you've learned and help young students every day of the work week! Teaching is a fun, creative, rewarding and challenging career. It is well paid with salaries starting at ~\$50K and peaking at ~\$100K for ten months of work. Further, because a significant portion of secondary mathematics teachers do not have strong mathematics backgrounds, mathematics majors who want to teach mathematics are in high demand. Recent data shows that even if every California (CA) mathematics major graduating next June chose to teach, more

than half of the state's open secondary mathematics teaching positions would not be filled.

UCLA is one of the top California universities with graduates who go on to earn a CA mathematics teaching credential. Research shows that over 80% of UCLA mathematics graduates who go on to complete their teaching credential in the UCLA Teacher Education Program remain in teaching after 5 years. This is a stark contrast to the Los Angeles Unified School District average of 62%! In addition, evidence demonstrates that a significant fraction of UCLA Mathematics Department teacher preparation program graduates become mathematics teacher-leaders, increasing their impact on the mathematics education of local communities.

We encourage you to participate in our programs. We offer solid preparation for a career in teaching, a strong foundation for future leadership in the field, a cohort of colleagues to support you in the classroom, and dependent on funding, financial support toward your goals.

For general questions about UCLA Teaching Preparation Program, contact the undergraduate math advisor. For additional questions or general inquiries about a career in teaching mathematics, please feel free to contact the Curtis Center Executive Director, Heather Dallas — dallas@math.ucla.edu

### **Teaching Preparation Programs**



### UCLA CaTeach - Math

UCLA California Teach - Math offers up to four years of courses, field experiences, credential preparation, and professional networking opportunities for undergraduates interested in teaching mathematics . In the program, mathematics professors, mathematics educators, and current mathematics teachers will work with you to provide you with the content and pedagogical content knowledge necessary to be a high quality mathematics teacher. Each year of the program includes mathematics courses, mathematics education courses, observation and participation in local schools, and credential preparation. Students may enroll in anywhere from one to all four years of the program, and those who complete all four years are thoroughly prepared for admission to a CA credential program.

#### www.cateach.ucla.edu



### The Joint Mathematics Education Program (JMEP)

The Joint Math/Ed Program is a collaborative effort of the UCLA Mathematics Department and the Graduate School of Education's Teacher Education Program. In this program, students begin work toward a CA Preliminary Single Subject Teaching Credential in Mathematics and a Master of Education degree during their senior year. The program enables students to earn a full time salary (about \$40,000) while teaching full time in Los Angeles urban schools during the academic year immediately following their bachelor's degree. Students accepted to the JMEP are automatically enrolled in the CalTeach - Math Senior Year.

# Subject Matter Preparation Program (SMPP) for the CA Teaching Credential

Applicants for a CA Preliminary Single Subject Teaching Credential in Mathematics must verify their "subject matter competence" to teach mathematics in one of two ways: 1.) complete a CA-approved "subject matter program" and obtain verification of completion from the university with the approved program or 2.) achieve a passing score on the three part California Subject Matter Examination for Teachers (CSET).

The UCLA Mathematics Department is a CA-approved "subject matter program" in mathematics. The program is comprised of mathematics courses, most of which are common to most mathematics majors, and the Math 105ABC sequence. Students who complete the department's Mathematics for Teaching major will qualify for the department's CA-approved subject matter program. At the end of their senior year, students may request a letter from the Curtis Center Executive Director's office verifying their completion of these courses and thus their subject matter competence for the CA Single Subject Teaching Credential in Mathematics.

For more information and to apply, see the UCLA Curtis Center website. curtiscenter.math.ucla.edu/undergraduates curtiscenter.math.ucla.edu/undergraduates/joint-math-education-program

### **Programming In Computing — PIC Lab**

The PIC Lab supports both PIC students learning programming and math students who wish to use analytical software. The lab is reserved for PIC and math students only.

Student accounts have 1 GB of disk space on the network drive and may print 200 pages per class per quarter at no charge. No additional printing is allowed.

Accounts are automatically created for all eligible students each quarter or can be requested at the Student Services Office in MS 6356.

Hours may vary each quarter. See webpage for actual hours each quarter. Reduced hours during finals week.

Lab Location: Math Sciences 2000 www.pic.ucla.edu/piclab (310) 825-7267

### Fall, Winter and Spring Quarter

Monday - Friday	9:00 am - 6:00 pm
Sunday	1:00 pm - 5:00 pm

### **Summer Sessions**

Monday - Thursday 10:00 am - 5:00 pm

Friday, Saturday, Sunday Closed

### **Suggested Academic Schedule**

### **Minimum Requirements**

- Pass the calculus sequenced courses with a letter grade of "C" or better in each course, and with a minimum overall 2.5 grade point average. Repetition of more than two mathematics sequenced courses, or of any mathematics sequenced course more than once, results in automatic dismissal from the major.
  - \* The Mathematics/Economics major requires a minimum overall 2.7 grade point average.
- Pass Math 115A and Math 131A with a grade of "C-" or better in each course.
- Students must declare a math major before reaching 160.0 units (minus AP units awarded).
- Pre-major requirements will vary depending on the major.

1st Year	Math 31A Math 31B Math 32A	<b>All Majors:</b> Start the two-year calculus sequence with Math 31A, Math 31B or Math 32A according to initial placement. Take one course per quarter until done. (Begin taking other required pre-major courses.)		
2nd Year	Math 32B Math 33A	<b>All Majors:</b> Finish the two-year calculus sequence.		
	Math 33B	Take Math 115A if Math 33A is completed.		
3rd Year	Math 115A Math 131A	<b>All Majors:</b> Take Math 115A, if not taken at the end of 2nd Year.		
	+ Other Upper Division Major Requirements	Take Math 131A. (It is strongly recommended to take this course after taking Math 115A. For everything else, let your interests guide you. You can take the course as long as you meet the prerequisites.)		
		<b>Mathematics Major:</b> Math 131B, Math 132, Math 120A, Math 110A, Math 110B		
		<b>Mathematics/Economics Major:</b> Econ 101, Econ 102, Econ 103 (with its lab component), Math 131B, Math 170A, Math 170B, Math 174E		
		<b>Financial-Actuarial Major:</b> Math 175, Math 170A, Math 170B, Math 172B, Math 173A		
		<b>Applied Mathematics Major:</b> Math 131B or Math 132, Math 142, at least one of the required two-quarter sequences and/or math electives		
		<b>Mathematics of Computation Major:</b> Math 131B or Math 132, Math 151A, Math 151B, math and/or CS electives		
		<b>Mathematics for Teaching:</b> Math 170A or Stats 100A, Math 117 or Math 110A, Math 123 or Math 120A, math electives		
4th Year	Remaining Upper Division Major Requirements	<b>All Majors:</b> Complete the major requirements.		

www.ugeducation.ucla.edu/degreepath/majors www.ucla.mymajors.com

### **Academic Planner**

### 1<sup>st</sup> Year

Fall	Winter	Spring	Summer

### 2<sup>nd</sup> Year

Fall	Winter	Spring	Summer

### 3<sup>rd</sup> Year

Fall	Winter	Spring	Summer

### 4<sup>th</sup> Year

Fall	Winter	Spring	Summer

## **Quarter Course Planner**

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00					
9:00					
10.00					
10.00					
11:00					
12:00					
1:00					
2:00					
3.00					
5.00					
4:00					
5:00					
6:00					