

# GRADUATE PROGRAM

(master's degree, doctoral degree, certificate of advanced study,  
Credential requiring graduate-level course work)

## CATALOG STATEMENT REVISION REQUEST

**Return original to:**

*Division of Research and Graduate Studies  
Thomas Administration Building, Room 130  
Mail Stop TA 51*

Graduate Program: MA in Mathematics  
Department: Mathematics  
Contact Person: Oscar Vega  
Phone: 8-4903  
E-mail: ovega@csufresno.edu  
Effective Term/Year: Fall 2019

**PURPOSE OF FORM:** To propose revision of a graduate program catalog statement (program description and/or requirements) as it appears in the University Catalog. The proposed program changes if approved will be binding on students who are advanced to candidacy under the new catalog statement. NOTE: Revisions in graduate courses and proposals for new graduate courses are submitted on separate forms available through the Division of Research and Graduate Studies, phone 8-2448.

**INSTRUCTIONS:** Use attachments to this sheet to indicate the changes that you propose. Make changes as space allows directly on a 8.5" x 11" xerographic copy of the entire page(s) of your graduate program statement (description/requirements) as it appears in the most recent University Catalog, including page numbers. Use "mock-up" style: cross out wording to be deleted; type new language in margins. If there is no sufficient space in the margins to type lengthy additions, designate inserts (a, b, c, etc.). Attach fully typed language for each insert on additional sheets. Address question on these instructions to the Dean, phone 8-2448.

Routine proposals for graduate program changes are reviewed by the Graduate Curriculum Subcommittee. Extensive, substantive changes are reviewed by the University Graduate Committee.

Those planning to propose a new or extensively revised graduate program (master's, doctoral, or certificate of advanced study), including a proposal for a revised or an additional option under an existing graduate degree, should schedule a meeting with the Research and Graduate Dean.

**JUSTIFICATION:** Explain why the proposed changes in the graduate program are needed. Attach additional pages as necessary. Special justification and approval are required for proposals to increase master's degree program units above 30 units in academic fields, and 60 units in professional fields. Such justification must include comparative information concerning similar programs at representative universities, and outline adherence to accreditation standards if applicable. Document the impact of the proposed change and/or any increased program units on program students and department resources.



*- For committee use only -*

**UNIVERSITY GRADUATE COMMITTEE/GRADUATE CURRICULUM  
SUBCOMMITTEE REVIEW RECOMMENDATION:**

Request Approved

Request Denied

Request Deferred

\_\_\_\_\_  
Date of Action

Explanation:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Recommendation approved by:

**Dean, Research and Graduate Studies/or designee**

\_\_\_\_\_  
Typed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**M.S.**

# Mathematics, ~~M.A.~~

## DEPARTMENT

### Department of Mathematics

Rajee Amarasinghe, Chair  
Peters Business Building, Room 381  
559.278.2992  
www.fresnostate.edu/csm/math/

MN in Mathematics, Minor

~~M.S. in Mathematics, M.A.~~ **MS in Mathematics, M.S.**

~~M.S. in Mathematics - Teaching Option, M.A.~~ **MS in Mathematics - Teaching Option, M.S.**

BS in Mathematics - General Math Option, B.S.

BS in Mathematics - Pure Math Option, B.S.

BS in Mathematics - Applied Math Option, B.S.

BS in Mathematics - Statistics Option, B.S.

BS in Mathematics - Teaching Option, B.S.

BS in Mathematics - Integrated Credential Option, B.S.

CRED in Single Subject Credential - Mathematics

Courses Offered

Mathematics and related subjects play important dual roles in our culture. On the one hand, mathematics is a study in its own right; on the other hand, it is an indispensable tool for expressing and understanding ideas in the sciences, engineering, and an increasing number of other fields. As a consequence, employment opportunities for mathematicians have been expanding in recent years. The courses offered by the department are designed to develop skills in, and an appreciation and understanding of, both roles.

Because there are so many different areas in which a trained mathematician can find employment or continue studies, the department offers a large number of electives within the mathematics major. By selecting appropriate courses, students have considerable flexibility to accommodate their individual interests. Students should consult with a department adviser for specific recommendations as to which electives are suited to their career paths.

Electives in applied mathematics prepare students to assume positions in technical industries or government employment, or to continue advanced studies in the applied area.

Electives in pre-college teaching in mathematics provide students with the necessary background for obtaining a California Secondary Teaching Credential in mathematics. In order to complete the credential requirements, a fifth year of education courses, classroom observation, and practice teaching is needed. At the present time, there is an increasing demand for well-trained people in this area.

Electives in pure mathematics prepare students for the pursuit of graduate studies leading to advanced degrees and employment at the college or university level, or research in industries.

Electives in statistics and probability provide a foundation for students planning to work as statisticians for industry or government agencies. They also can enhance employment opportunities in the bioscience and health-related fields. Statistics courses (in addition to MATH 75 [or 75A and B], 76, and 77) are essential for the first two Actuarial Examinations offered by the Society of Actuaries.

## REQUIREMENTS

### Science

#### Master of ~~Arts~~ Degree Program Requirements

**MS** The ~~M.A.~~ in mathematics is designed for students who wish to study mathematics at an advanced level. Within this degree program, students may choose to complete the traditional track or the teaching option. The traditional track best satisfies the needs of students who wish to work in business or industry, teach at community college, or go on to pursue a Ph.D. in mathematics. The teaching option is designed especially for students who wish to enhance their high school mathematics teaching and/or assume a leadership role in high school mathematics education and beyond, or who wish to pursue a Ph.D. in mathematics education.

### Course Requirements:

~~Master's Degree in Mathematics (M.A.) Traditional Track~~

Core curriculum (MATH 251, 271) [see Advising Note 2] (6 units)

~~Elective curriculum (A combination of approved courses see Advising Note 1) (21 units)~~

Project (MATH 298) or Thesis (MATH 299) (3 units)

**Total (30 units)**

See insert A

### Additional Requirements:

- All students must attend a Plagiarism Workshop and sign the Mathematics Department's Honor Code Statement Regarding Academic Integrity and Plagiarism.
- In order to satisfy the University Graduate Writing Skills Requirement, the student must submit a formal paper demonstrating writing skill in mathematics at the graduate level. This graduate level paper may be a research proposal, a literature review in some mathematical area of interest, a paper from a directed research project, or some other paper that meets the objectives for the writing requirement as stated in "Satisfaction of the Graduate Writing Requirement," found in the Graduate Studies Handbook for the Master of Arts in Mathematics. Deadlines are given in that document.

### Science

### Graduate Advising Notes

1. Under the direction of the department graduate adviser, each candidate should prepare and submit for approval a program of courses as early as possible.
2. All graduate students should obtain a copy of the Department of Mathematics Graduate Studies Handbook for more detailed information on the program requirements.
- ~~3. CI 250 is a prerequisite of CI 150.~~

### Graduate Program

### Masters of Science (M.S.)

The Department of Mathematics offers a ~~Master of Arts (M.A.)~~ in Mathematics. A bachelor's degree is required in order to be admitted to a graduate program at California State University, Fresno.

In order to be admitted to classified graduate standing, applicants must have undergraduate preparation equivalent to a California State University, Fresno mathematics major and have a 3.0 grade point average in their upper-division mathematics courses. Applicants lacking the above preparation may be admitted conditionally. These students will become classified after meeting additional requirements as set by the graduate coordinator. Coursework taken to achieve classified standing may not be applied towards credits for the graduate program.

All applicants are required to take the GRE Mathematics subject test. Applicants' GRE Mathematics subject test scores are expected to be at least 500.

In addition, two letters of recommendation from faculty at the applicant's undergraduate institution are required. Letters should be sent directly to the graduate coordinator.

## FACULTY

For faculty phone numbers and e-mail, see the campus directory.

For more on the faculty, see the faculty pages.

The faculty pages are updated by the department or program.

Name	Degree	Email	Phone
Allen, Nathan S	Master of Arts	nallen@csufresno.edu	
Amarasinghe, Thisath R	Doctor of Philosophy	ramarasi@csufresno.edu	559.278.4136
Amarasinghe, Tikiri K	Second Master of Science	tamarasinghe@csufresno.edu	

## Proposed Changes in Catalog Program Description: Traditional Option

### Insert A.

#### Course Requirements:

*Master's Degree in Mathematics (M.S.) Traditional Track*

Core curriculum (MATH 251, 271) [see Advising Note 2] (6 units)

Additional courses (6 units):

- Choose one of the following: MATH 232, MATH 252, or MATH 272;
- Choose one of the following: MATH 223, MATH 228, or MATH 263.

Elective curriculum (A combination of approved courses - see Advising Note 1) (15 units)

Project (MATH 298) or Thesis (MATH 299) (3 units)

**Total (30 units)**

# Mathematics - Teaching Option, ~~M.A.~~ <sup>M.S.</sup>

## DEPARTMENT

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~~MA in Mathematics - Teaching Option, Major~~ **MS in Mathematics - Teaching Option, M.S.**

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### Courses Offered

Mathematics and related subjects play important dual roles in our culture. On the one hand, mathematics is a study in its own right; on the other hand, it is an indispensable tool for expressing and understanding ideas in the sciences, engineering, and an increasing number of other fields. As a consequence, employment opportunities for mathematicians have been expanding in recent years. The courses offered by the department are designed to develop skills in, and an appreciation and understanding of, both roles.

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## REQUIREMENTS

### Science

#### Master of ~~Arts~~ Degree Program Requirements

**MS** The ~~MA~~ in mathematics is designed for students who wish to study mathematics at an advanced level. Within this degree program, students may choose to complete the traditional track or the teaching option. The traditional track best satisfies the needs of students who wish to work in business or industry, teach at community college, or go on to pursue a Ph.D. in mathematics. The teaching option is designed especially for students who wish to enhance their high school mathematics teaching and/or assume a leadership role in high school mathematics education and beyond, or who wish to pursue a Ph.D. in mathematics education.

See insert B

**Course Requirements:**

*Master's Degree in Mathematics (M.A.) with a Teaching Option*  
 Core curriculum (CI 250 [see Advising Note 3], MATH 251, 260, 271 [see Advising Note 2]) (12 units)  
 Mathematics elective curriculum (A combination of approved courses- see Advising Note 1) (12 units)  
 Education elective curriculum (CI 275 or an approved CI 2801 course) (3 units)  
 Project (MATH 298) (3 units)  
**Total (30 units)**

**Additional Requirements:**

- All students must attend a Plagiarism Workshop and sign the Mathematics Department's Honor Code Statement Regarding Academic Integrity and Plagiarism.
- In order to satisfy the University Graduate Writing Skills Requirement, the student must submit a formal paper demonstrating writing skill in mathematics at the graduate level. This graduate level paper may be a research proposal, a literature review in some mathematical area of interest, a paper from a directed research project, or some other paper that meets the objectives for the writing requirement as stated in "Satisfaction of the Graduate Writing Requirement," found in the Graduate Studies Handbook for the Master of Arts in Mathematics. Deadlines are given in that document.

**Science**

**Graduate Advising Notes**

1. Under the direction of the department graduate adviser, each candidate should prepare and submit for approval a program of courses as early as possible.
2. All graduate students should obtain a copy of the Department of Mathematics Graduate Studies Handbook for more detailed information on the program requirements.
- ~~3. CI 250 has a prerequisite of CI 159.~~

**Graduate Program**

**Masters of Science (M.S.)**

The Department of Mathematics offers a ~~Master of Arts (M.A.)~~ in Mathematics. A bachelor's degree is required in order to be admitted to a graduate program at California State University, Fresno.

In order to be admitted to classified graduate standing, applicants must have undergraduate preparation equivalent to a California State University, Fresno mathematics major and have a 3.0 grade point average in their upper-division mathematics courses. Applicants lacking the above preparation may be admitted conditionally. These students will become classified after meeting additional requirements as set by the graduate coordinator. Coursework taken to achieve classified standing may not be applied towards credits for the graduate program.

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Amarasinghe, Thisath R	Doctor of Philosophy	ramarasi@csufresno.edu	559.278.4136
Amarasinghe, Tikiri K	Second Master of Science	tamarasinghe@csufresno.edu	



## Proposed Changes in Catalog Program Description: Teaching Option

### Insert B.

#### Course Requirements:

*Master's Degree in Mathematics (M.S.) with a Teaching Option*

Core curriculum (MATH 251, 271) [see Advising Note 2] (6 units)

Additional courses (9 units):

- Choose one of the following: MATH 200 or MATH 201;
- Choose one of the following: MATH 200, MATH 201, or MATH 232;
- Choose one of the following: MATH 228, MATH 252, or MATH 260.

Elective curriculum (A combination of approved courses - see Advising Note 1) (12 units)

Project (MATH 298) or Thesis (MATH 299) (3 units)

**Total (30 units)**

## M.A.-to-M.S. Redesignation Justification

The Department of Mathematics' Master's program requires modernization and diversification, in part to make the program more competitive, and hence, attract more capable students. Therefore, the Department proposes implementing the changes recommended herein and redesignating the awarded degree from the current M.A. in Mathematics to M.S. in Mathematics.

The justifications for the M.A. to M.S. degree redesignation include the following.

- The Department wishes to be consistent with the corresponding process of B.A. to B.S. redesignation, which has become effective as of Fall 2018.
- The Department wants to better align our Mathematics Graduate Program with those on the other 22 campuses of the CSU system. According to the Committee's study held in Spring 2017, Fresno State is one of only six CSU campuses to offer an M.A., but not an M.S. in Mathematics. In fact, of the 18 CSU campuses offering Master's degrees in mathematics, seven only offer an M.S. This is detailed in the attached spreadsheet.
- During the 2016-17 AY, we had a site visit to review our programs. The visit occurred on Sept. 28th and 29th, 2016. The review panel consisted of Prof. Kim Morin, Theatre Arts, CSU Fresno, Dr. Saeed Attar, Professor of Chemistry, Director of Honors College, CSU Fresno, and Dr. Ivona Grzegorzczuk, Professor and Chair, Department of Mathematics, California State University, Channel Islands.

A conversion from M.A. to M.S. was one of the recommendations of the Program Review Committee.

- The Department's conversion effort also reflects the results of a survey of both undergraduate and graduate math majors administered by the Graduate Program Redesign Committee in Spring 2017. Thirty-two undergraduate students responded to their survey, representing approximately a 22.5% response rate. Of those students, only 30 (5 freshmen, 9 juniors, 12 seniors, and 4 super seniors) actually completed it. Seventeen of these students indicated interest in pursuing graduate studies, 16 of whom said they wanted to pursue a Master's degree, one wanted to pursue a Ph.D., and 9 wanted to pursue both. Of all of the respondents, 15 indicated a preference in pursuing a M.S. degree, while only 2 indicated interest in an M.A. and 11 had no preference between the M.A. and M.S. degrees. In response to interest in pursuing a Master's degree at Fresno State (as opposed to elsewhere), 18 of 26 respondents said they preferred Fresno State. Of all respondents, 16 indicated a preference for an M.S. and 9 indicated no preference, which is similar to the results stated above. Finally, 25 of the 30 undergraduate respondents indicated that a comprehensive redesign of the Master's program would make them more interested in pursuing graduate studies at Fresno State. The graduate students responded at a higher rate, and we received 14 responses of the 15 students enrolled in the program. Of the graduate student responses, 13 indicated interest in teaching at the community college level after graduation. Interestingly, only 3 students indicated a desire to earn a doctoral degree at some point, while 5 did not and 6 were not sure. When asked if they thought that a Master of Science (M.S.) degree or a Master of Arts (M.A.) degree would better prepare them for their

career/educational objectives, 4 students indicated that the M.S. would be better preparation; 1 indicated that the M.A. would be better; 6 said either degree; and 3 were not sure. Finally, when asked if they would be interested in getting an M.S. degree, instead of the M.A. that we currently offer, the vast majority (9 students) responded affirmatively.

- The Department also believes that this conversion has the potential to attract highly qualified international students, as some international students appear to perceive that an M.S. degree is better than an M.A.
- It is possible that this change will also be a useful tool in recruiting talented faculty.
- The proposed new program provides a graduate curriculum that is more modern, diversified, and better equipped for in-depth explorations of various areas of contemporary mathematics, as well as the creation of additional choices for Master's theses and research projects.
- The proposed changes create the potential for the program's future growth and development, such as the development of further options along the same lines as the B.S. program.

## M.A. and M.S. programs in CSU campuses

Campus	M.A.	M.A. has options?	M.S.	M.S. has options?	4+1	Bridges to Ph.D.
Bakersfield	Y	Yes	No		N	N
Channel Islands	N		Y	Yes	N	N
Chico	N		Y	No	N	N
Dominguez Hills	Y	Yes	No		N	N
East Bay	N		Y	Yes	N	N
Fresno	Y	Yes	No		N	N
Fullerton	Y	Yes	Y	Yes: Statistics (online)	N	N
Long Beach	Y	Yes	Y	Yes	N	N
Los Angeles	Y	Yes	Y	Yes	N	Not in math
Northridge	N		Y	No. They have specializations: math & applied math	N	N
Pomona	N		Y	Yes	N	N
Sacramento	Y	No	No		N	N
San Bernardino	Y	Yes	No			N
San Diego	Y	Yes	Y	Yes	N	N
San Francisco	Y	No	No		N	N
San Jose	Y	Yes	Y	Yes	N	N
San Luis Obispo	N		Y	No	Y	N
San Marcos	N		Y	No	N	N

**Note:** In yellow campuses that have an M.A. in mathematics but not an M.S. in mathematics