

# CURRICULUM CHANGE PROPOSAL

## APPROVAL PAGE

Proposal Title: Change of statistics to data science concentration in mathematics

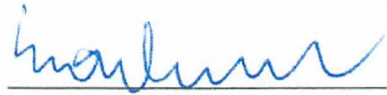
College: Science

Department: Mathematical Sciences

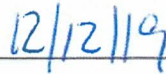
### DEPARTMENT CHAIR

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I have read the enclosed proposal and approve this proposal on behalf of the department.



Signature

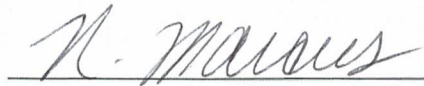


Date

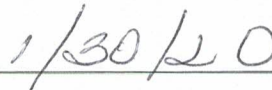
### COLLEGE CURRICULUM COMMITTEE CHAIR

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I have read the enclosed documents and approve the proposal on behalf of the college curriculum committee.



Signature

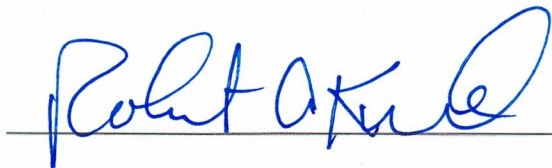


Date

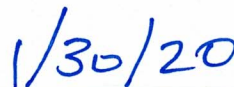
### COLLEGE DEAN

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I have read the enclosed documents and approve the proposal on behalf of the college. I certify that the necessary funds will be allocated by the college in support of this proposal.



Signature



Date

## UNDERGRADUATE CURRICULUM CHANGE MEMO

**Date:** 10/11/2019

**From:** Amy Wagler, Department of Mathematical Sciences

**Through:** Christina Mariani, Department of Mathematical Sciences

**Through:** Robert A. Kirken, College of Science

**To:** Carla Ellis, Chair of UGCC

**Proposal Title:** Change of statistics to data science concentration in mathematics

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Throughout the nation, data science professionals are a needed asset for supporting the high-tech industry and existing major players in government, utilities and banking. Data scientists are essential for organizations wishing to make use of data for informing change in their organization. Similarly, in the state of Texas, there is a growing demand for data science professionals. Data scientists are essential in a variety of fields, such as banking, finance, health care, security, and other fields.

The existing concentration in statistics would train a degree seeker from any field in the essentials of statistical modeling and analysis. However, in order to meet this industry demand, we proposed changes to the concentration which include the following:

- 1) Change the concentration name from statistics to data science. This will attract a greater variety of students who want to develop data analytic skills.
- 2) Allow for multiple pathways for the concentration that allows flexibility for students of varying background, interests and goals. This concentration revision allows students to choose from a set of relevant courses, rather than routing all students into the same set of courses.
- 3) Provide courses in statistical programming and data mining to undergraduates. This revised concentration will allow students to take (optionally) newly offered senior level classes in statistical programming and data mining. These are in high demand at the undergraduate level and we have piloted the programming course with undergraduates.



Bell Hall 100 747-5536

The University of Texas at El Paso

El Paso, Texas 79968-0509

## Bachelor of Science Degree Plan

**Note: Unofficial - Based on New Catalog**

## Mathematics - Statistics Concentration

### Minimum Requirements (120/37)

Name

Address

**Major: Mathematics**

Minor: None

Department Chair: **Dr. Maria Cristina Mariani**

**Director of Advising: Dr. Tina Garza**

At Least C Grades in Lower Division Math Courses & Core Curriculum

At Least C Grades in Lower Division Courses in the Major & Minor

At Least 2.0 GPA Overall and in the Major

**Departmental Advisor: Dr. Andrew Pownuk**

Pre-Requisites Locaed on Next Page

## REQUIREMENTS \*\*\*

[illegible]

**COMMENTS:**

**This mathematics (statistics concentration) degree plan is just a sample. Your individualized degree plan may differ.**

Dr. Nancy Marcus, Associate Dean, College of Science

| COURSES                                                                    | Pre-Requisites                                      |
|----------------------------------------------------------------------------|-----------------------------------------------------|
| <b>BIOL 1305-1107</b> - General Biology and Lab                            | MATH 0311 or Higher                                 |
| <b>BIOL 1306-1108</b> - Organismal Biology and Lab                         | BIOL 1306, MATH 0311 or Higher                      |
| <b>CHEM 1305-1105</b> - General Chemistry I and Lab                        | MATH 1509 (can be taken concurrently)               |
| <b>CHEM 1306-1106</b> - General Chemistry II and Lab                       | MATH 1508, CHEM 1305-1105                           |
| <b>CS 1320</b> - Computer Programming for Scientists and Engineers         | Math 1508 or Higher                                 |
| <b>CS 1301-11-1</b> - Introduction to Computer Science and lab             | Math 1508 or Higher                                 |
| <b>GEOL 1313-1103</b> - Introduction to Physical Geology                   | None                                                |
| <b>GEOL 1314-1104</b> - Introduction to Historical Geology                 | GEOL 1313                                           |
| <b>MATH 1312</b> - Calculus II                                             | MATH 1411                                           |
| <b>MATH 1411</b> - Calculus I                                              | MATH 1508 or Placement                              |
| <b>MATH 2300</b> - Discrete Mathematics                                    | MATH 1411 or MATH 1312 or MATH 2313                 |
| <b>MATH 2313</b> - Calculus III                                            | MATH 1312 or MATH 2326                              |
| <b>MATH 2325</b> - Introduction to Higher Mathematics                      | None                                                |
| <b>MATH 3300</b> - History of Mathematics                                  | MATH 1411                                           |
| <b>MATH 3319</b> - Elementary Number Theory                                | MATH 3325                                           |
| <b>MATH 3320</b> - Actuarial Mathematics                                   | STAT 3330                                           |
| <b>MATH 3323</b> - Matrix Algebra                                          | MATH 1312                                           |
| <b>MATH 3325</b> - Principles of Mathematics                               | MATH 1312                                           |
| <b>MATH 3327</b> - Applied Algebra                                         | None                                                |
| <b>MATH 3328</b> - Foundations of Mathematics                              | MATH 3325                                           |
| <b>MATH 3329</b> - Geometry                                                | MATH 3325                                           |
| <b>MATH 3335</b> - Applied Analysis I                                      | MATH 2313                                           |
| <b>MATH 3341</b> - Introduction to Analysis                                | MATH 3325                                           |
| <b>MATH 4325</b> - Modern Algebra                                          | MATH 3325                                           |
| <b>MATH 4326</b> - Linear Algebra                                          | MATH 3325                                           |
| <b>MATH 4329</b> - Numerical Analysis                                      | MATH 3323                                           |
| <b>MATH 4336</b> - Applied Analysis II                                     | MATH 2326                                           |
| <b>MATH 4370</b> - Topics Seminar                                          | Junior and Senior Status                            |
| <b>PHYS 2420 or PHYS 2320-2120</b> - Introductory Mechanmics and Lab       | Lecture and Lab Together, MATH 1411                 |
| <b>PHYS 2421 or PHYS 2321-2121</b> - Introductory Electromagnetism and Lab | Lecture and Lab Together, MATH 1312, PHYS 2320-2120 |
| <b>STAT 2480</b> - Probability and Statistics                              | MATH 1320 or MATH 1508 or MATH 1411                 |
| <b>STAT 3330</b> - Probability                                             | MATH 1312                                           |
| <b>STAT 3381</b> - Noparametric Statistics                                 | STAT 2480                                           |
| <b>STAT 4380</b> - Statistics I                                            | STAT 3330                                           |
| <b>STAT 4385</b> - Applied Regression Analysis                             | STAT 2480                                           |

## BS in Mathematics with a Concentration in ~~Statistics~~ Data Science

| Code                                                                  | Title                                                      | Hours |
|-----------------------------------------------------------------------|------------------------------------------------------------|-------|
| <b>Designated Core</b>                                                |                                                            |       |
| Required Courses: <sup>1</sup>                                        |                                                            |       |
| <del>CS 1401</del><br>or <del>CS 1320</del>                           | Intro to Computer Science<br>Computer Programming Sci/Engr | 4     |
| <a href="#">PHYS 2420</a>                                             | Introductory Mechanics                                     | 4     |
| <a href="#">PHYS 2421</a>                                             | Introductory Electromagnetism                              | 4     |
| <del>RWS 3359</del>                                                   | <del>Technical Writing</del>                               | 3     |
| <b>University Core Curriculum</b>                                     |                                                            |       |
| <a href="#">Complete the University Core Curriculum requirements.</a> |                                                            | 42    |
| <b>Statistics Concentration</b>                                       |                                                            |       |
| Required Courses:                                                     |                                                            |       |
| <a href="#">MATH 1312</a>                                             | Calculus II                                                | 3     |
| <a href="#">MATH 1411</a>                                             | Calculus I                                                 | 4     |
| <a href="#">MATH 2313</a>                                             | Calculus III                                               | 3     |
| <a href="#">MATH 3325</a>                                             | Principles of Mathematics                                  | 3     |
| <a href="#">MATH 4329</a>                                             | Numerical Analysis                                         | 3     |
| <a href="#">STAT 2480</a>                                             | Elementary Statistical Methods                             | 4     |
| <a href="#">STAT 3330</a>                                             | Probability                                                | 3     |
| <a href="#">STAT 4380</a>                                             | Statistics I                                               | 3     |
| <a href="#">STAT 4385</a>                                             | Applied Regression Analysis                                | 3     |
| <a href="#">MATH 2300</a><br>or <a href="#">MATH 2325</a>             | Discrete Mathematics<br>Intro. to Higher Mathematics       | 3     |



| Code                                                | Title                                         | Hours             |
|-----------------------------------------------------|-----------------------------------------------|-------------------|
| <a href="#">MATH 3323</a>                           | Matrix Algebra                                | 3                 |
| or <a href="#">MATH 4326</a>                        | Linear Algebra                                | <a href="#">3</a> |
| <a href="#">STAT 4329</a>                           | <a href="#">Intro to Data Mining</a>          | <a href="#">4</a> |
| <a href="#">STAT 4474</a>                           | <a href="#">Statistical Programming</a>       |                   |
| Select nine hours from the following:- <sup>3</sup> |                                               | 9                 |
| <del><a href="#">CS 3195</a></del>                  | <del>Junior Professional Orientation</del>    |                   |
| <del><a href="#">CS 3320</a></del>                  | <del>Comp Arch II: Adv. Design /Imp</del>     |                   |
| <del><a href="#">CS 3331</a></del>                  | <del>Adv. Object-Oriented Programng</del>     |                   |
| <del><a href="#">CS 3350</a></del>                  | <del>Automata/Computabi/Formal Lang</del>     |                   |
| <del><a href="#">CS 3360</a></del>                  | <del>Design/Implementation Prog Lan</del>     |                   |
| <del><a href="#">CS 3370</a></del>                  | <del>Computer Graphics</del>                  |                   |
| <del><a href="#">CS 3432</a></del>                  | <del>Comp Arch I: Comp Org/Design</del>       |                   |
| <del><a href="#">CS 4173</a></del>                  | <del>Computer Science Internship</del>        |                   |
| <del><a href="#">CS 4181</a></del>                  | <del>Undergraduate Seminar</del>              |                   |
| <del><a href="#">CS 4273</a></del>                  | <del>Computer Science Internship</del>        |                   |
| <del><a href="#">CS 4310</a></del>                  | <del>Software Eng: Requirements Eng</del>     |                   |
| <del><a href="#">CS 4311</a></del>                  | <del>Software Eng: Design &amp; Implmnt</del> |                   |
| <del><a href="#">CS 4316</a></del>                  | <del>Computer Networks</del>                  |                   |
| <del><a href="#">CS 4317</a></del>                  | <del>Human-Computer Interaction</del>         |                   |
| <del><a href="#">CS 4320</a></del>                  | <del>Artificial Intelligence</del>            |                   |
| <del><a href="#">CS 4330</a></del>                  | <del>Mobile Application Development</del>     |                   |
| <del><a href="#">CS 4339</a></del>                  | <del>Secure Web-Based Systems</del>           |                   |
| <del><a href="#">CS 4342</a></del>                  | <del>Data Base Management</del>               |                   |
| <del><a href="#">CS 4351</a></del>                  | <del>Computer Security</del>                  |                   |
| <del><a href="#">CS 4352</a></del>                  | <del>Compilers and Interpreters</del>         |                   |
| <del><a href="#">CS 4365</a></del>                  | <del>Topics in Soft Computing</del>           |                   |

| Code                              | Title                          | Hours |
|-----------------------------------|--------------------------------|-------|
| <u>CS 4371</u>                    | Computer Science Problems      |       |
| <u>CS 4373</u>                    | Computer Science Internship    |       |
| <u>CS 4374</u>                    | Software Construction          |       |
| <u>CS 4375</u>                    | Theory of Operating Systems    |       |
| <u>CS 4376</u>                    | Comp Desn-Mkng & Risk Analysis |       |
| <u>CS 4377</u>                    | Cyber-Sec for Critical Op Tech |       |
| <u>CS 4379</u>                    | Software Reverse Engineering   |       |
| <u>CS 4387</u>                    | Software Integration and V&V   |       |
| <u>CS 4390</u>                    | Special Topics in Computer Sci |       |
| <u>CS 4392</u>                    | Rsrch Methods/Computer Science |       |
| <u>CS 4393</u>                    | Senior Project                 |       |
| <u>MATH 3300</u>                  | History of Mathematics         |       |
| <u>MATH 3319</u>                  | Elementary Number Theory       |       |
| <u>MATH 3320</u>                  | Actuarial Mathematics          |       |
| <u>MATH 3323</u>                  | Matrix Algebra                 |       |
| <u>MATH 3327</u>                  | Applied Algebra                |       |
| <u>MATH 3328</u>                  | Foundations of Mathematics     |       |
| <u>MATH 3329</u>                  | Geometry                       |       |
| <u>MATH 3335</u>                  | Applied Analysis I             |       |
| <u>MATH 3341</u>                  | Introduction to Analysis       |       |
| <u>MATH 4325</u>                  | Modern Algebra                 |       |
| <u>MATH 4329</u>                  | Numerical Analysis             |       |
| <u>MATH 4336</u>                  | Applied Analysis II            |       |
| <u>STAT 3381</u>                  | Nonparametric Statistics       |       |
| <b>Other Science Requirements</b> |                                |       |

| Code                                                                                      | Title                                                               | Hours          |
|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------|
| <del>Choose one sequence from the Following</del>                                         |                                                                     | <del>8</del>   |
| <del>BIOL 1305<br/>&amp; BIOL 1107</del>                                                  | <del>General Biology<br/>and Topics in Study of Life I</del>        |                |
| <del>And</del>                                                                            |                                                                     |                |
| <del>BIOL 1306<br/>&amp; BIOL 1108</del>                                                  | <del>Organismal Biology<br/>and Organismal Biology Laboratory</del> |                |
| <del>OR</del>                                                                             |                                                                     |                |
| <del>CHEM 1305<br/>&amp; CHEM 1105</del>                                                  | <del>General Chemistry<br/>and Laboratory for CHEM 1305</del>       |                |
| <del>And</del>                                                                            |                                                                     |                |
| <del>CHEM 1306<br/>&amp; CHEM 1106</del>                                                  | <del>General Chemistry<br/>and Laboratory for CHEM 1306</del>       |                |
| <del>OR</del>                                                                             |                                                                     |                |
| <del>GEOL 1313<br/>&amp; GEOL 1103</del>                                                  | <del>Intro to Physical Geology<br/>and Lab for GEOL 1313</del>      |                |
| <del>And</del>                                                                            |                                                                     |                |
| <del>GEOL 1314<br/>&amp; GEOL 1104</del>                                                  | <del>Intro to Historical Geol<br/>and Lab for GEOL 1314</del>       |                |
| <del>Minor (Optional)</del>                                                               |                                                                     |                |
| <del>Take additional semester hours with advisor approval</del>                           |                                                                     |                |
| <del>Upper Division Requirement</del>                                                     |                                                                     |                |
| <del>Select a total of thirty-seven hours of upper division course work<sup>3</sup></del> |                                                                     | <del>37</del>  |
| <del>Total Hours</del>                                                                    |                                                                     | <del>120</del> |
| <b>Additional Required Courses</b>                                                        |                                                                     | <b>10</b>      |
| CS 1301/1101                                                                              |                                                                     | 4              |
| RWS 3359                                                                                  |                                                                     | 3              |
| SCI 1301                                                                                  |                                                                     | 3              |



|                         |           |
|-------------------------|-----------|
| <b>Minor (Optional)</b> | <b>18</b> |
|-------------------------|-----------|

Complete an 18-hour minor or 18 hours of electives, at least 10 must be upper-division

|                  |          |
|------------------|----------|
| <b>Electives</b> | <b>6</b> |
|------------------|----------|

Take an addition 6 hours of upper-division electives

|                                          |
|------------------------------------------|
| <b><u>Upper Division Requirement</u></b> |
|------------------------------------------|

|                                                                                        |           |
|----------------------------------------------------------------------------------------|-----------|
| <u>Select a total of thirty-seven hours of upper division course work.<sup>3</sup></u> | <u>37</u> |
|----------------------------------------------------------------------------------------|-----------|

|                           |                   |
|---------------------------|-------------------|
| <b><u>Total Hours</u></b> | <b><u>120</u></b> |
|---------------------------|-------------------|