|  | NEW/CHANGE PROGRAM REQUEST <br> Undergraduate Programs |  | UUPC Approval $\qquad$ <br> UFS Approval $\qquad$ <br> Banner |
| :---: | :---: | :---: | :---: |
| FLORIDA <br> ATLANTIC <br> UNIVERSITY | Department Mathematical Science <br> College <br> Science |  | Catalog |
| Program Name <br> Bachelor of Science degree in Mathematics |  | New Program* Change Program* | Effective Date (TERM \& YEAR) <br> Spring 2024 |
| Please explain the requested change(s) and offer rationale below or on an attachment. <br> The Department of Mathematical Sciences at Florida Atlantic University (FAU) proposes to revise the BS program in Mathematics. The primary goal is to increase enrollment in mathematics degree programs at FAU. This program revise will update our curriculum offerings to improve student preparedness for the demands of the current labor market, and better align the programs with the expertise of the core faculty groups within the department. <br> We propose to have four concentrations in the BS program: <br> (1) Pure Mathematics <br> (2) Mathematical Cryptology <br> (3) Mathematical Biology <br> (4) Statistics and Data Science <br> (for more details, please see the attached note.) |  |  |  |
| *All new programs and changes to existing programs must be accompanied by a catalog entry showing the new or proposed changes <br> Faculty Contact/Email/PhoneConsult and list departments that may be affected by the <br> change(s) and attach documentation |  |  |  |
| Approved by <br> Department Chair <br> College Curriculum Chair <br> College Dean <br> UUPC Chair <br> Undergraduate Studies Dean $\qquad$ <br> UFS President $\qquad$ <br> Provost $\qquad$ |  |  | Date $\qquad$ $\qquad$ |

Email this form and attachments to mjenning@fau.edu seven business days before the UUPC meeting.

Catalog Change (texts in green are newly added)

## Mathematics

Bachelor of Science (B.S.)

The B.S. program in Mathematics consists of four concentrations:
(1) Pure Mathematics
(2) Mathematical Cryptology
(3) Mathematical Biology
(4) Statistics \& Data Science

To complete the B.S. program, students will complete the specific courses for one of the concentrations. All students will take two courses in calculus; at least one statistics course; Discrete Mathematics, and at least one programming course.
(1) Pure Mathematics Concentration

| Galculus 1 Calculus with Analytic Geometry 1 | MAC 2311 | 4 |
| :--- | :--- | :---: |
| Galculus 2 Calculus with Analytic Geometry 2 | MAC 2312 | 4 |
| Galculus 3 Calculus with Analytic Geometry 3 | MAC 2313 | 4 |
| General Chemistry 1 and Lab or | CHM 2045\&L | or |
| General Physics 1 and Lab | PHY2048\&L | $4-5$ |
| Discrete Mathematics | MAD 2104 | 3 |
| Introduction to Computational Math | MAD 2502 | 3 |
| Differential Equations 1 | MAP 2302 | 3 |
| Matrix Theory | MAS 2103 | 3 |
| Introduction to Advanced Mathematics | MHF 3202 | 3 |
| Mathematical Problem Solving | MAT 4937 | 3 |
| Linear Algebra 2 | MAS 4107 | 3 |
| Modern Analysis | MAA 4200 | 3 |
| Vector Calculus | MAS 3156 | 3 |
| Modern Algebra | MAS 4301 | 3 |
| Introductory Complex Analysis | MAA 4402 | 3 |
| Probability and Statistics 1 | STA 4442 | 3 |
| Introductory Analysis 1 | MAA 4226 | 3 |


| Introductory Algebra 1 | MAS 4304 | 3 |
| :---: | :---: | :---: |
| Upper-division math electives |  | 12 |
|  |  | 9 |
| Mathematics Total (excluding science) |  | 57 |
| (2) Mathematical Cryptology Concentration |  |  |
| Calculus and Analytic Geometry 1 | MAC 2311 | 4 |
| Calculus and Analytic Geometry 2 | MAC 2312 | 4 |
| Calculus and Analytic Geometry 3 | MAC 2313 | 4 |
| General Chemistry 1 and Lab or | CHM 2045\&L | or |
| General Physics 1 and Lab | PHY2048\&L | 4-5 |
| Discrete Mathematics | MAD 2104 | 3 |
| Matrix Theory | MAS 2103 | 3 |
| Programming 1 | Cop 2220 | 3 |
| Introductory Number Theory | MAS 3203 | 3 |
| Introduction to Advanced Math | MHF 3202 | 3 |
| Probability and Statistics 1 | STA 4442 | 3 |
| Cryptography and Information Security | CIS 4362 | 3 |
| Modern Algebra | MAS 4301 | 3 |
| Programming 2 | COP 3014 | 3 |
| Data Structures and Algorithm Analysis | COP 3530 | 3 |
| Approved upper-division math electives, choose 2. For example, but not limited to the following (courses marked with * apply to the undergraduate Cybersecurity Certificate program) |  |  |
| Computational Statistics | STA 3100 |  |
| Vector Calculus | MAS 3156 |  |
| Engineering Mathematics 1 | MAP3305 |  |
| Numerical Methods | MAD 3400 |  |
| Linear Algebra 2 | MAS 4107 |  |
| Introduction to Methods in Complex Systems | MAP 4112 |  |
| Mathematics of Cybersecurity* | MAP 4190 |  |
| Mathematics for Cryptography* | MAS 4206 |  |
| Graph Theory | MAD 4301 |  |
| Topology for Data Science | MTG 4325 |  |
| Numerical Analysis 1 | MAD 4401 |  |
| Introduction to Coding Theory* | MAD 4605 |  |
| Post-quantum Cryptography (New course, in the approval cycle) | MAD 4475 |  |

Cryptography of Blockchain (New course, in the approval cycle)

| Approved upper-division EECS Electives in |  |
| :--- | :--- |
| the Cybersecurity Certification program, |  |
| choose 3. For example, but NOT limited to |  |
| the following: | COP 3540 |
| Introduction to Database Structure | COP 4045 |
| Python Programming | COT 4400 |
| Design and Analysis of Algorithms | COT 4402 |
| Theory of Computation | CDA 4321 |
| Introduction to Cryptographic Engineering | CIS 4634 |
| Applied Cryptography and Security | CNT 4411 |
| Network and Data Security | CAP 4612 |
| Applied Machine Learning and Data Mining | CAP 4613 |
| Introduction to Deep Learning | CAP 4630 |
| Introduction to Artificial Intelligence | COP 4610 |
| Computer Operating Systems | CAP 4770 |
| Introduction to Data Mining and Machine |  |

Approved upper-division EECS Electives in the Cybersecurity Certification program, choose 3. For example, but NOT limited to the following:

Concentration Total (excluding science)

## (3) Mathematical Biology Concentration

| Mathematics for Biological Sciences 1 (New | MAP 2483 | or |
| :--- | :---: | :---: |
| Course) | MAC 2233 | or |
| Methods of Calculus | MAC 2241 | or |
| Life Sciences Calculus 1 | MAC 2311 | $3-4$ |
| Calculus with Analytic Geometry 1 | (New | MAP 2484 |
| Mathematics for Biological Sciences | 4 |  |
| Course) | STA 2023 | 3 |
| Introductory Statistics | MAD 2502 | 3 |
| Introduction to Computational Math | MAD 2104 | 3 |
| Discrete Math | BSC 1010 | 3 |
| Biological Principles | BSC 1011 | 3 |
| Biodiversity | CHM 2045 | 3 |
| General Chemistry 1 | CHM 2046 | 3 |
| General Chemistry 2 | MAP 4103 | 3 |
| Applied Mathematical Modeling | STA 3173 | 3 |
| Introduction to Biostatistics | PCB 3063 | or |
| Genetics | PCV 4043 | 4 |
| Principles of Ecology | IDS 4139 | 3 |
| Artificial Intelligence Applications in Biology | CAP 4612 | 3 |
| Applied Machine Learning and Data Mining |  | 6 |

Upper-division science electives (choose 2) with Prefix BOT, BSC, MCB, OCB, PCB, ZOO,

RI: Statistical learning
RI: Introduction to Data Science
RI: Industrial Problems in Applied Math
RI: Neurobiology of Learning and Memory
RI: Neurophysiclogy

STA 4241
CAP 3786
MAP 4913
PSB 4810
PCB 4832C

Concentration Total (including science) 59-60
Note: For this concentration, MAP 2484 can be replaced by MAC 2312, MAP 2302, and MAS 2103.

## (4) Statistics \& Data Science Concentration

| Calculus and Analytic Geometry 1 | MAC 2311 | 4 |
| :--- | :---: | :---: |
| Calculus and Analytic Geometry 2 | MAC 2312 | 4 |
| Calculus and Analytic Geometry 3 | MAC 2313 | 4 |
| General Chemistry 1 and Lab or | CHM 2045\&L | or |
| General Physics 1 and Lab | PHY2048\&L | $4-5$ |
| Discrete Mathematics | MAD 2104 | 3 |
| Matrix Theory | MAS 2103 | 3 |
| Introduction to Computational Math | MAD 2502 | 3 |
| Programming 1 | COP 2220 | 3 |
| Introduction to Advanced Math | MHF3202 | 3 |
| Modern Algebra | MAS4301 | 3 |
| Introduction to Complex Analysis | MAA4402 | 3 |
| Probability and Statistics 1 | STA4442 | 3 |
| Applied Statistics 1 and Applied Statistics Lab | STA4234 and | 3 |
| Programming 2 | STA 4202L | 3 |
| Data Structures and Algorithm Analysis | COP 3014 | 3 |
| Approved Math Electives, choose 2, at least | COP 3530 | 3 |
| one upper-division |  | 6 |
| Concentration Electives, choose 2: |  | 6 |

RI: Introduction to Data Science CAP 3786
RI: Statistical Learning
STA 4241
Topology for Data Science
MTG 4325
Applied Mathematical Modeling
MAP 4103
Industrial Problems in Applied Math
MAP 4913
Introduction to Deep Learning
CAP 4613
Introduction to Data Mining and Machine
Learning

Introduction to Data Science and Analytics
Time series
Computational Statistics
Introduction to Methods in Complex Systems
Theory of Computation
Concentration Total (excluding science)

CAP 4773
STA 4853
STA 3100
MAP 4112
COT4420

## Required Minimum GPA 2.5

Notes:

1. Upper-division mathematics electives: These electives must be chosen from courses offered by the Department of Mathematical Sciences and numbered 3000 or higher. The following courses may not be used as upper-division mathematics electives: STA 3163, STA 3173, STA 3949, MAT 3949, MAP 4945, or STA 4821.
2. In calculation of the departmental GPA, where relevant, the highest grade in the course will be used.
3. Because of overlap in course content, Mathematics majors may receive credit for at most one course in each of the following pairs: (MAP 2302, MAP 3305), (MAP 4303, MAP 4306), (STA 4443, STA 4032).
4. The upper-division mathematics courses required for these programs that are completed at FAU must be completed with at least a 2.2 GPA (B.A. program) or 2.5 GPA (B.S. program).
5. Any mathematics course taken at another institution must be completed with a grade of at least "C-" "C" to be considered part of either baccalaureate program.
6. Mathematical Sciences majors are required to consult with their advisors at least once a year.
