Mathematics and Statistics

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The Department of Mathematics and Statistics offers a B.A degree in Mathematical Sciences and B.S. degrees in Mathematics, Mathematics Secondary Education*, and Mathematics Teaching* for Inclusive Education.

> *These programs are considered "dual majors" under the College's system of classification. Dual majors are formed when at least one program must be attached to the other to be viable. The Inclusive Education and secondary education programs fall into this category.

The B.S. Mathematics major offers specializations in three areas: Mathematics, Applied Mathematics, and Data Science and Statistics. In each of these programs, students are provided with a foundational mathematical background which will be utilized in advanced study in one of these areas:

B.S. *Mathematics (Mathematics specialization):* In this program students take a wide range of mathematics courses, including analysis and abstract algebra. Each student will develop a program, through advisement, of upper-level mathematics courses according to their own interests. These courses will reflect the student's goals: to develop the student's knowledge and appreciation of mathematics, to prepare the student for a variety of careers in both the public and private sectors, and/or prepare the student for future graduate study.

B.S. *Mathematics (Applied Mathematics specialization):* The applied math curriculum is designed to give students a solid mathematical foundation while emphasizing mathematical topics that are often used to solve real-world problems. Students in this program take courses including differential equations and analysis, with flexibility in their choice of upper-level courses to allow students to pursue their interests in mathematics and statistics. This specialization prepares students to pursue a variety of careers in both the public and private sectors following graduation and also prepares students for future graduate study.

B.S. *Mathematics (Data Science and Statistics specialization):* Students in this program develop a range of mathematical, statistical, and computational skills which can be applied to a wide variety of real-world, data-driven problems. After completing foundational courses in statistics and mathematics, students have freedom to further their studies in courses aligned with their interests in data science, statistics, or mathematics. Students are prepared to enter graduate study or employment in a variety of careers in both the public and private sectors.

B.S. *Mathematics Secondary Education:* In this program, students take mathematics and professional courses which prepare them to meet the educational requirements for the New Jersey certificate to teach mathematics K–12. Students participate in student-teaching experiences in their senior year. A 5-year Special Secondary Education option that leads to a Master's degree in addition to the K-12 Mathematics certification is available.

B.S. *Mathematics Teaching–Inclusive Education:* In this program, students take mathematics and professional courses which prepare them to meet the educational requirements for the New Jersey certificate to teach K-6. Students wishing to take the mathematics Praxis test could also be certified to teach mathematics K–12. Options for a Master's degree in Special Education, Teaching English as a Second Language, or Teaching the Deaf and Hard of Hearing are available.

B.A. *Mathematical Sciences:* In this program students take a range of mathematics and/or statistics courses. Each student will develop a program, through advisement, of upper-level courses in the department according to their own interests. These courses will reflect the student's goals: to develop the student's knowledge and appreciation of mathematics and to prepare the student for a variety of careers in both the public and private sectors.

Minors: The department offers minors in three areas: Mathematics, Statistics, and Actuarial and Financial Risk Studies.

Academic Regulations

Prerequisites

- If a student has not met the exact prerequisites of a course as stated in this Bulletin but believes that the requirements have been satisfied through equivalent experiences, the student may gain admission to the course with the approval of the department chair.
- Majors must earn a minimum grade of C– in a course which is a prerequisite to another course.

Graduation Requirements

- A minimum of six course units in the major must be earned by taking TCNJ courses in the department. A minimum of four of the final six course units in the major must be earned in the department.
- Students must satisfy the retention requirements for their major to graduate.
- In courses offered by the Department of Mathematics and Statistics, a grade of C- or better must be earned in the courses that satisfy a graduation requirement, with the following exception. Students may count one D or D+ grade in a 300 or 400 level course.
- In addition to these general requirements, there are additional requirements for the following majors and specializations:

  Mathematics major: Applied Math Specialization

  1. A grade of C- or better must be earned in the Computer Science Correlate courses.

  Mathematics Secondary Education and Mathematics Teaching majors

  Overall 3.0 grade point average to meet the state certification requirements.

In addition, Mathematics Secondary Education majors must earn:

1. A 2.75 GPA in order to enroll in Clinical Practice I (SED 399, MTT 390 and RAL 328)
2. **A** 3.0 GPA and a B- in all Education courses (with the exception of MTT380) and Clinical Practice I courses in order to enroll in Clinical Practice II (MTT 490)
3. **A grade of** B- or better in MTT 490 (Student teaching) and SED 498 (capstone).

Retention Requirements

- Students must meet the above graduation requirements and the following grade requirements to be retained in the major. If a student fails to meet the standard, students will have one year to meet the standard. Students concerned about the standards should speak with their advisor.
- Majors must earn a C- in all courses that count towards the degree. A single grade of D or D+ may be earned in a 300/400 MAT/STA course that is not a prerequisite for a subsequent course.
- Majors must earn a grade of at least C- in the foundational courses MAT200 and MAT229.

In addition, Mathematics Secondary Education majors in both 4- and 5-year programs must meet the following grade requirements:

- After attempting 8 units at the college, if the cumulative GPA is 2.75 or below, a student will be placed on probation for the major. They are expected to consult with their advisor to come up with plan to get to an overall GPA of 3.0 and submit the plan to the Math Education Coordinator. If by end of 2 subsequent (regular) semesters, the overall GPA does not rise above 3.0, the department reserves the right to dismiss the student from the program. Non-matriculated and provisional students are immediately subject to the policy at time of matriculation if GPA below 2.75.

Dismissal Policy

At the end of the semester, if a major in the Department of Mathematics and Statistics has not met one or more of the department's retention standards, he/she will be given notice that he/she must meet the standard(s) within one calendar year in order to continue in the major. If the standard has not been satisfied within one calendar year the student may be dismissed from the major. In addition, if a student who is a major in the Department of Mathematics and Statistics does not pass any courses satisfying requirements for the major for a calendar year (2 regular semesters), he/she may be dismissed from the major.

Entrance Requirements

In order to transfer into all Mathematics majors, a student must meet the following grade requirements and be approved by the chair(s):

a. C- or better in MAT 127
b. C- or better in MAT 200

For the **Mathematics Secondary Education or Mathematics Teaching majors**, students must also meet:

- Additional requirements for the respective Education department.

Seminar Requirement
All students except for Mathematics Teaching students are required to attend four departmental seminars in their junior and/or senior year before they can take the capstone course. Both department seminars and School of Science colloquia (in which mathematics or statistics is presented) will count.

All students in the Mathematics major (Mathematics, Applied Mathematics, and Data Science and Statistics specializations) are required to take a 0.5 unit seminar in their sophomore year. Details will be provided by the department.

Requirements for Honors
For all majors and specializations within the Department of Mathematics and Statistics:

1. Eligibility: A 3.5 GPA in math and stats courses.

2. To receive departmental honors, a student must engage in independent research during their junior or senior year. The student should successfully complete a full unit of a MAT/STA/MTT 493: Independent Research course during a semester they spend on-campus, prior to their graduating semester, and prepare a paper which will be due the middle of their last (graduating) term. A public presentation will be given in the two-week period following the submission of the paper.

Independent Study/Guided Study/Independent Research Courses

- At most one course unit of Independent Study, Guided Study, or Independent Research may count as one of the options courses listed in the major requirements under “Courses in the major” for the B.S. degrees. Independent Study, Guided Study, or Independent Research may not count as one of the options courses listed for the B.A. in Mathematical Sciences.
- The total course load of a student taking Independent Study, Guided Study, or Independent Research should be at most 4.5 course units.
- Independent Study, Guided Study, or Independent Research may not be taken in order to improve a grade, or to replace a course that a student failed to sign up for.
- In exceptional circumstances, the above rules may be overruled by the department chair.
- A minimum 3.0 GPA in courses taken in the Department of Mathematics and Statistics is required of any student enrolling in Independent Study or Guided Study.

Course Waiver

If a student has a strong background in a particular course, then the student may acquire or receive a course waiver in one of two ways: 1) credit by examination; or 2) waiver of the course through prior equivalent experience (transfer credit).

Calculus Readiness Requirement

Any student who has not satisfied the College's calculus readiness requirements is not allowed to register for any calculus course offered by the Department of Mathematics and Statistics. Students may choose to be placed based on SAT or ACT scores, or they may submit AP scores or they may opt to take a placement test. Students who choose placement based on SAT or ACT scores will be placed as follows:

SAT-Math score 630 or ACT score 28 or higher and four years of math including Algebra I, Algebra II, Geometry and Trigonometry	Placed into Calculus
SAT-Math score between 550 and 620 or ACT score between 24 and 27 and at least two years of math including Algebra and Geometry.	Placed into Introduction to Functions (MAT 119) or Precalculus (MAT 120). Upon completion of MAT 119, a student may take MAT 125: Calculus for Business and Social Sciences. Upon completion of MAT 120, a student may take MAT 125 or MAT 127: Calculus A.
SAT-Math score below 550 and ACT score below 24	Placed into Intermediate Algebra, MAT 095. *(MAT 095 does not count toward graduation but is considered credit-bearing for financial aid, tuition and full-time status.)*

Note: Introduction to Functions (MAT 119), Precalculus (MAT 120) and Intermediate Algebra (MAT 095) are offered every semester and sometimes during the Summer Sessions.

Students who choose placement based on AP Scores will be placed as follows:

AP Course	*Score*	*TCNJ Equivalent*	*Course Units*	*Next Math Course to Take*
PreCalculus	4 or higher	MAT 120	0*	Calculus (MAT 125 or MAT 127)
AB Calculus	4 or higher	MAT 127: Calculus A or MAT 125: Business Calculus	1	MAT 128: Calculus B
BC Calculus	3	MAT 127: Calculus A or MAT 125: Business Calculus	1	MAT 128: Calculus B
BC Calculus	4	MAT 127: Calculus A and MAT 128: Calculus B	2	MAT 229: Multivariable Calculus
Statistics	3, 4	STA 115 Statistics (Liberal Learning/Quantitative Reasoning)	1	Discuss with an adviser
Statistics	5	STA 215 Statistical Inference (Liberal Learning/Quantitative Reasoning)	1	Any 300-level course

*Note: AP PreCalculus scores are considered for placement into Calculus only and not for transfer credit.

Study Abroad

One of the opportunities available to students pursuing a degree in Mathematics or Statistics is to study abroad for a semester or a year. Students interested in studying abroad should meet with their faculty advisor early in their college career to plan a curriculum so that they may complete their studies in four years. They will also need to meet with the Director of the Center for Global Engagement. The students must receive approval from the chair of the department in order for courses taken abroad to count toward requirements for the major.

Mathematics Major: Mathematics Specialization

Requirements for the Major: Please see above for the program retention and graduation requirements. All Mathematics specialization students are required to take 13.5 mathematics course units and a 0-course-unit orientation. The 13.5 course units will consist of the following **nine required** courses:

MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 128/Calculus B	1 course unit
MAT 200/Proof Writing through Discrete Mathematics	1 course unit
MAT 205/Linear Algebra: Theory and Applications	1 course unit
MAT 229/Multivariable Calculus	1 course unit
MAT 275/Sophomore Seminar	.5 course unit
MAT 305/Abstract Algebra	1 course unit
MAT 310/Real Analysis	1 course unit
MAT 498/Capstone	1 course unit

and **six additional** course units. The six additional course units can be any MAT courses at the 300- or 400-level. One non-MAT course from a departmentally approved list in PAWS may be counted. One of these course units must be MAT courses at the 400-level.

Additional Required Correlates (two course units):

1) MAT 203/MAT270:Introduction to Mathematical Computing or CSC120:Foundations of Computational Thinking;

2) One natural science lab course from the list approved by the Department of Mathematics and Statistics, (posted on the department's website).

Suggested First-Year Course Sequence

Fall

First Year Seminar (FYS) course	1 course unit
MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 127/Calculus A (if not exempted)*	1 course unit
MAT 203/MAT270:Introduction to Mathematical Computing or CSC120:Foundations of Computational Thinking	1 course unit
Foreign Language (if not fulfilled)**	1 course unit

Spring

MAT 128/Calculus B	1 course unit
MAT 200/Proof Writing through Discrete Mathematics	1 course unit
College Core Course	1 course unit
Foreign Language (if not fulfilled)***	1 course unit

**It is recommended that students exempted from this course take Calculus B.*

*** It is recommended that students exempted from these courses take other College Core courses.*

***It is recommended that students exempted from these courses take other College Core courses.

Note: *Chinese 151 and 152, Japanese 151 and 152 are intensive courses and carry two course units of credit each. Students should take this into account when planning a normal four-course semester.*

Mathematics Major: Applied Mathematics

Requirements for the Major: Please see above for program retention and graduation requirements. The Applied Mathematics Specialization requires 14.5 course units in the major and a 0-course-unit orientation. The 14.5 course units will consist of the following ten required courses:

MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 128/Calculus B	1 course unit
MAT 200/Proof Writing through Discrete Mathematics	1 course unit
MAT 205/Linear Algebra: Theory and Applications	1 course unit
STA 215/Statistical Inference or STA216/Statistical Inference and Probability	1 course unit
MAT 229/Multivariable Calculus	1 course unit
MAT 275/Sophomore Seminar	.5 course unit
MAT 310/Real Analysis	1 course unit
MAT 326/Differential Equations	1 course unit
MAT 498/Capstone	1 course unit

and six additional course units. The six additional course units can be any MAT/STA courses at the 300- or 400-level subject to the following conditions:

1. One 400 level course must be on the Applied Mathematics Options List, available in the Applied Mathematics Advising Checklist on the department website
2. Two additional 300 or 400 level courses must be on the Applied Mathematics Options List
3. At most two STA 300 or 400 level courses and at most 1 non-MAT/STA course from the approved list in PAWS may be counted towards this 6 unit requirement

Additional Required Correlates (normally three course units):

1) CSC 220 1 course unit

2) CSC230 or MAT341*. 1 course unit*

3) One natural science lab course from the list approved by the Department of Mathematics and Statistics (posted on the department's website). 1 course unit

** Students who use MAT341 to satisfy the correlate requirement may not also use MAT341 to satisfy an option requirement for the major*

Suggested First-Year Course Sequence

Fall

First Year Seminar (FYS) or other College Core course	1 course unit
MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 127/Calculus A (if not exempted)*	1 course unit
CSC 220/Computer Science I	1 course unit
Second Language (if not exempted)**	1 course unit

Spring

MAT 128/Calculus B	1 course unit
MAT 200/Proof Writing through Discrete Mathematics	1 course unit
FYS 1XX/First Year Seminar or other College Core course	1 course unit
Foreign Language (if not exempted) ***	1 course unit

**It is recommended that students exempted from this course take Calculus B.*

*** It is recommended that students exempted from these courses take other College Core courses.*

****It is recommended that students exempted from these courses take other College Core courses. Note: Chinese 151 and 152, Japanese 151 and 152 are intensive courses and carry two course units of credit each. Students should take this into account when planning a normal four-course semester.*

Mathematics Major: Data Science and Statistics

Requirements for the Major: Please see above for program retention and graduation requirements. Data Science and statistics graduates need to have a strong underpinning in mathematics in addition to all the necessary statistical knowledge and skills. The Data Science and Statistics Specialization requires 14.5 course units in the major and a 0-course-unit orientation. The 14.5 course units consist of the following:

Required Courses: 9.5 required course units and a 0-course-unit orientation

MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 128/ Calculus B	1 course unit
MAT 200/Proof Writing through Discrete Mathematics	1 course unit
MAT 205/Linear Algebra: Theory and Applications	1 course unit
MAT 229/Multivariable Calculus	1 course unit
MAT 275/Sophomore Seminar	.5 course unit
MAT 316/Probability	1 course unit
STA 215/Statistical Inference	1 course unit
STA 305/Regression Analysis	1 course unit
STA 410/Mathematical Statistics	1 course unit
STA 498/Capstone	1 course unit

Three Data Science/Statistics option courses which can be chosen from any

STA courses at the 300/400-level	3 course units

At minimum, 1 of the option courses must have a Data Science designation. The courses with this designation are:

STA 306/Applied Multivariate Analysis
STA 307/Data Mining and Predictive Modeling

Two additional options courses which can be chosen from any

MAT/STA courses at the 300/400-level	1-2 course units
One non-MAT/STA course from the following list	0-1 course units

CSC 315/Database Systems
CSC 426/Machine Learning
ECO 420/Econometrics
FIN 365/Quantitative Finance and Risk Management
ISTG 615/Business Analytics (Regression Modeling II)
PBHG 652/Biostatistics for Public Health
PUBG 511/Program Evaluation and Causal Inference for Policy Analysis
SOC 302/Quantitative Research Methods

Additional Required Correlates (*two course units)*

CSC120/Foundation of Computational Thinking or MAT 203/Introduction to Mathematical Computing	1 course unit
One natural science course from the list approved by the Mathematics and Statistics department. The course must have a lab component	1 course unit

Suggested First-Year Course Sequence

Fall

First Year Seminar (FYS) course	1 course unit
MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 127/Calculus A (if not exempted)*	1 course unit
Foreign Language (if not exempted)**	1 course unit
CSC120/Foundation of Computational Thinking or MAT 203/Introduction to Mathematical Computing	1 course unit

Spring

MAT 128/Calculus B	1 course unit

STA 215/Statistical Inference	1 course unit
Foreign Language (if not exempted)**	1 course unit
College Core course (Arts and Humanities or Social Sciences and History)	1 course unit

** It is recommended that students exempted from this course take Calculus B.*

*** It is recommended that students exempted from these courses take other College Core courses. Note: Chinese 151 and 152, Japanese 151 and 152 are intensive courses and carry two course units of credit each. Students should take this into account when planning a normal four-course semester.*

Mathematics Secondary Education

Requirements for the Major: Please see above for program retention and graduation requirements. An overview of the entire secondary-level teacher-preparation sequence and requirements can be found in the section of this bulletin for the Department of Educational Administration and Secondary Education.

Students planning to teach high school or middle school mathematics should consult with advisors in both mathematics and secondary education in planning their academic program. These plans should take into account requirements for: the major, College Core, professional courses, and state certification. To be retained in the program, a student must earn at least a 2.75 cumulative grade point average (CGPA) before enrolling in the full year of Clinical Practice. The student must establish a minimum 3.0 CGPA, obtain at least a B- in MTT 390, and must have completed STA 216, MAT 301, MAT 351, and MAT 305 and all but at most 3 of their math major requirements prior to Clinical Practice II.

Teacher-education candidates must have a 3.0 or higher cumulative grade point average to be recommended by TCNJ for a New Jersey issued teaching license. They also must meet the state hygiene/physiology requirement, the state Harassment, Intimidation, and Bullying Prevention (HIB) training certificate requirement, and pass the appropriate Praxis Subject examination. Teacher-education candidates will receive a "certificate of eligibility with advanced standing" which requires a candidate to be provisionally certified for their first year of teaching. After successfully completing State required mentoring teaching, the candidate will be eligible for a permanent certificate.

Mathematics/Statistics Course Requirements: All Mathematics: Secondary Education students are required to take a minimum of eleven mathematics/statistics course units, and a 0-course-unit orientation. The eleven course units will consist of nine required course units and two MAT/STA options:

MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 200/Proof Writing through Discrete Mathematics	1 course unit
MAT 205/Linear Algebra: Theory and Applications	1 course unit
MAT 229/Multivariable Calculus	1 course unit
MAT 255/Perspectives on the Development of Mathematics	1 course unit
MAT 301/Number Theory	1 course unit
MAT 305/Abstract Algebra	1 course unit

MAT 351/Geometry	1 course unit
STA 216/Statistical Inference and Probability	1 course unit
MAT 497/Topics in Secondary Mathematics from an Advanced Viewpoint	1 course unit

and two MAT/STA options: 2 course units

- one chosen from (MAT310, MAT316 or MAT326)
- one can be any MAT/STA course at the 300/400 level

Content Methods and Professional Sequence Courses: All Mathematics: Secondary Education students are required to take the following methods and professional courses:

SED 224/Adolescent Learning and Development	1 course unit
EFN 299/School and Communities	1 course unit
SPE 322/Inclusive Practices	1 course unit
MTT 380/Methods of Teaching Mathematics I	1 course unit
SED 399/Pedagogy in Secondary Schools	1.5 course units
RAL 328/Reading in Secondary Education	0.5 course unit
MTT 390/Methods of Teaching Mathematics II	1 course unit
MTT 490/Clinical Practice II: Student Teaching	2 course units
SED 498/Collaborative Capstone for Professional Inquiry	1 course unit

Additional Required Correlates

MAT 270/MAT 203 Intro to Mathematical Computing or CSC 120 Foundation of Computational Thinking I e science course (BIO 201, CHE 201, or PHY 201)	1 course unit

Quantitative Reasoning Requirements

MAT 127/Calculus A	1 course unit
MAT 128/Calculus B	1 course unit

Suggested First-Year Course Sequence for 4-year program

Fall

FYS 1XX/First Year Seminar (CC)	1 course unit
MAT 099/Orientation to Mathematics and Statistics	0 course unit
MAT 127/Calculus A*	1 course unit
MAT 270/MAT 203 Intro to Mathematical Computing	1 course unit
Second Language	1 course unit

Spring

MAT 200/Proof Writing through Discrete Mathematics	1 course unit
MAT 128/Calculus B	1 course unit
College Core course	1 course unit
Second Language	1 course unit
SED 099/Secondary Education College Seminar	0 course unit

**It is recommended that students exempted from this course take Calculus B*

Suggested First-Year Course Sequence for 5-year Special Secondary Education

Fall

FYS 1XX/First Year Seminar (CC)	1 course unit
MAT 099/Orientation to Mathematics and Statistics	0 course unit
MAT 127/Calculus A*	1 course unit
MAT 270/MAT 203 Intro to Mathematical Computing	1 course unit
College Core course	1 course unit

Spring

MAT 200/Proof Writing through Discrete Mathematics	1 course unit
MAT 128/Calculus B	1 course unit
College Core course	1 course unit
SED 099/Secondary Education College Seminar	0 course unit
SPE 103/Social & Legal Foundations of Special Education	1 course unit

**It is recommended that students exempted from this course take Calculus B*

Mathematics Major: Math Teaching-Teacher Preparation for Inclusive Education majors

Requirements for the Major: Please see above for program retention and graduation requirements. Students should consult with advisors in both mathematics and in the School of Education in planning their academic program. These plans should take into account requirements for the majors, College Core, professional courses, and state certification. To be retained in the program, a student must earn at least a 2.75 cumulative grade point average (CGPA) before enrolling in Clinical Practice I. The student must establish a minimum 3.0 CGPA, and must have completed all education prerequisites in order to be allowed to enroll in Clinical Practice II.

Candidates for a teacher education certificate must have a 3.0 or higher cumulative grade point average to successfully complete their teacher education program. They also must meet the state hygiene/physiology requirement, the state Harassment, Intimidation, and Bullying Prevention (HIB) training certificate requirement, and pass the appropriate Praxis examination. Teacher-education candidates will receive a "certificate of eligibility with advanced standing" which requires a candidate to be provisionally certified for their first year of teaching. After one year of successful teaching, the candidate is eligible for a permanent certificate.

Mathematics/Statistics Course Requirements for the Major
All Mathematics Teaching/Inclusive Education students will be required to take a **minimum** of eight mathematics/statistics course units, MAT 105, and a 0 course unit orientation.

MAT 105/Mathematical Structures & Algorithms for Educators (Education requirement)	1 course unit
MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 127/Calculus A	1 course unit
MAT 128/Calculus B	1 course unit

MAT 200/Proof Writing through Discrete Mathematics	1 course unit
MAT 205/Linear Algebra: Theory and Applications	1 course unit
MAT 212 or STA 216/Data Analysis for Middle School Teachers or Statistical Inference and Probability	1 course unit
MAT 211 or MAT 301/Systems for Middle School Teachers or Number Theory	1 course unit
MAT 215 or MAT 351/Geometry for Middle School Teachers or Geometry	1 course unit
At least one of the above must be a 300-level course.	
MAT 305/Abstract Algebra	1 course unit

*Suggested First-Year Mathematics Course Sequence**

Fall

MAT 099/Orientation to Mathematics and Statistics	0 course unit
MAT 127/Calculus A	1 course unit
MAT 105/Mathematical Structures & Algorithms for Educators	1 course unit

Spring

MAT 128/Calculus B	1 course unit
MAT 200/Proof Writing through Discrete Mathematics	1 course unit

**Consult individual major in the School of Education for remaining courses.*

B.A. in Mathematical Sciences

Requirements for the Major: Please see above for the program retention and graduation requirements. All Mathematics Sciences students are required to take 11.5 course units and a 0-course-unit orientation. The 11.5 course units will consist of the following **nine required** courses:

MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 128/Calculus B	1 course unit
MAT 200/Proof Writing through Discrete Mathematics	1 course unit
MAT 205/Linear Algebra: Theory and Applications	1 course unit
MAT 275/Sophomore Seminar	.5 course unit
MAT 498/Capstone	1 course unit

a choice one of three core options

MAT 305/Abstract Algebra	1 course unit
or MAT 310/Real Analysis	1 course unit
or MAT 316/Probability	1 course unit

and **four additional** course units. The four additional course units can be any MAT or STA courses at the 300- or 400-level including the two remaining courses not used to satisfy the core option course. One of the 4 course units may be at the 200 level but must be chosen from either MAT 229 or STA 215 or STA 216. The MAT 3xx or STA 3xx courses must have a number between 300 and 380. The MAT 4xx or STA 4xx courses must have a number between 400 and 480.

Additional Required Correlates (two course units):

1) MAT 203/Introduction to Computer Programming and Mathematical Computing or CSC 120/Foundations of Computational Thinking;

2) One natural science lab course from the list approved by the Department of Mathematics and Statistics, (posted on the department's website).

Suggested First-Year Course Sequence

Fall

First Year Seminar (FYS) course	1 course unit
MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 127/Calculus A (if not exempted)*	1 course unit
Foreign Language (if not exempted)**	1 course unit
CSC 120/Foundations of Computational Thinking or MAT 203/Introduction to Computer Programming and Mathematical Computing	1 course unit

Spring

MAT 128/Calculus B	1 course unit
MAT 200/Proof Writing through Discrete Mathematics	1 course unit
College Core Course	1 course unit
Foreign Language (if not exempted)***	1 course unit

**It is recommended that students exempted from this course take Calculus B.*

*** It is recommended that students exempted from these courses take other College Core courses.*

***It is recommended that students exempted from these courses take other College Core courses.
Note: *Chinese 151 and 152, Japanese 151 and 152 are intensive courses and carry two course units of credit each. Students should take this into account when planning a normal four-course semester.*

Minors in the Department of Mathematics and Statistics

The Department offers minors in Mathematics, Statistics, or Actuarial and Financial Risk Studies. The minor requirements will be defined by the Bulletin description at the time of application. Students must maintain the same mathematics and statistics cumulative average as required for graduation in the major.

Per TCNJ college policy, only one course taken as a part of the student's major may also be counted toward the student's minor; however, correlate courses for the major may be applied freely to the minor. Multiple minors may overlap by only one course.

Mathematics Minor

For a mathematics minor, a student must pass five MAT courses that are either MAT 128 or at the 200-level or above (except MAT 255, MAT 265, MAT 270). At least two of the courses must be at the 3xx/4xx level. Students must earn a 2.0 overall GPA in courses that count for the minor. All courses must have a grade of C- or higher, with the exception that a single grade of D or D+ is permitted in a 3xx/4xx level course. A minimum of four course units for the mathematics minor must be earned at The College of New Jersey.

Statistics Minor

For a statistics minor, a student must complete five courses as detailed below:

Required courses:	(2 course units)
STA 215/Statistical Inference and Probability or STA 216/Statistical Inference & Probability for Educators or ECO 105/Statistics 1 and (MAT 125 or MAT 127) or STA 145/Applied Statistics for Social Scientists and MAT 127	1 course unit
STA 305/Regression Analysis	1 course unit
Any three courses from the following:	(3 course units)
Any STA courses at the 300 or 400 level MAT 316/Probability One non-STA course from the following: CSC 426/Machine Learning ECO 420/Econometrics FIN 365/Quantitative Finance and Risk Management ISTG 615/ Business Analytics (Regression Modeling II) PBHG 652/Biostatistics for Public Health PUBG 511/Program Evaluation and Causal Inference for Policy Analysis SOC 302/Quantitative Research Methods	

Total: 5 **course units**

For the statistics minor, students must take five courses and achieve at least a 2.0 grade point average for all courses taken to fulfill the minor's requirements. Students must earn a grade of C- or higher in all courses taken for the minor, except that a D or D+ is permitted in at most one course at the 300 or 400 level.

Actuarial and Financial Risk Studies Minor

For the Actuarial and Financial Risk Studies Minor, the following prerequisite courses must be completed:MAT 128, MAT 200, and an introductory statistics course. This course can be any of: STA 215 or STA 216 or ECO 105 or STA 145. Students must then complete five required courses from the following two groups. The choice of courses depends on the major (see details following the two groups). The groups are:

GROUP A:

MAT 229/Multivariable Calculus	1 course unit
MAT 265/ Introduction to Financial Mathematics	1 course unit
STA 305/Regression Analysis OR	1 course unit
ECO 231/Applied Business Statistics	
MAT 316/Probability	1 course unit
STA 410/Mathematical Statistics	1 course unit
Gives VEE Statistics credit	

GROUP B:

ECO 102/Principles of Macroeconomics	1 course unit
MAT 265/Introduction to Financial Mathematics	1 course unit
FIN 201/Fundamental Financial Methods AND	1 course unit total
IST 201/Information Systems: Concepts and Applications	
Both of these are half-courses.	
FIN 310/Introduction to Investments and Financial Analysis	1 course unit
FIN 360/Financial Modeling	
OR FIN 410/Portfolio Management and Derivative Securities	
Only one of these two courses can count towards the minor.	

Additional Notes for All Minors:

- Students must complete ACC 201 to register for FIN 201. Combined, these courses give VEE-Accounting and Finance credit.
- While only ECO 102 is listed in Group B, it is recommended that all students also take ECO 101/*Principles of Microeconomics* as an elective in order to obtain VEE-Economics credit.
- To earn VEE credit, students must receive a grade of B- or higher.

For Data Science and Statistics Specialization: Students will select one course unit from Group A, which is required for all Data Science and Statistics majors, and double-count this course towards the Minor. They will then take four courses listed in Group B. Statistics Majors may not take ECO 231.

For Business Majors: Students will choose one course unit from Group B (which will be the double-counting course) and 4 course units from Group A. Note that only two course units can be at the 200-level.

For Mathematics Majors: Students may choose 5 course units from the courses in Groups A and B, but it is highly recommended that MAT 316 and STA 410 be among those selected. Mathematics majors may not count ECO 231 towards the minor. *For Other Majors:* Students will select courses from Groups A and B after consulting with their minor advisor.