Mathematics and Statistics

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The Department of Mathematics and Statistics offers a B.S. degree in three majors: Mathematics, Mathematics Secondary Education*, and Mathematics Teaching* for Elementary, Early Childhood, Deaf and Hard of Hearing, Special Education, and Urban 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 Elementary Education, Early Childhood Education, Special Education, Education of the Deaf and Hard-of-Hearing, and Urban Education sequences, and all secondary education programs fall into this category.

The Mathematics major offers specializations in four areas: Mathematics, Applied Mathematics, Statistics, and Data Science. 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:

*Mathematics (Mathematics specialization): In t*his program students take a wide range of mathematics courses, including analysis and abstract algebra. Each student will develop a program, through advisement, of taking upper-level mathematics courses according to his/her 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.

Mathematics (Applied Mathematics specialization): Students in this program take courses including differential equations and analysis. Students have a great deal of flexibility in their choice of upper-level courses in order 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 prepares students who wish to go on to graduate study in Applied Mathematics.

*Mathematics (Statistics specialization): Students in t*his program build upon mathematical skills acquired in the freshman and sophomore years which enable them to apply advanced statistical techniques to a wide variety of real-life problems arising in application areas such as business, government, and research. Students are prepared to enter either graduate study or employment as a data analyst.

*Mathematics (Data Science specialization): In t*his program, students develop the necessary mathematics, statistics, and computer science skills for pursuing a career in Data Science. Students will be prepared to do data-driven research in mathematics, statistics, science, and/or business, and to pursue graduate study in Data Science.

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 Urban Secondary Education option and a 5-year Special Secondary Education option that lead to a Master's degree in addition to the K-12 Mathematics certification are available.

Mathematics Teaching–Elementary, Early Childhood, Urban, Deaf and Hard of Hearing, and Special 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 in their respective education field. Students wishing to take the mathematics Praxis test could also be certified to teach mathematics K–12.

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
  1. Overall 3.0 grade point average to meet the state certification requirements.
  2. Students must meet the State of New Jersey's Basic Skills requirement before applying for Clinical Practice I and II.

3. A 2.75 GPA in order to enroll in Clinical Practice I (SED 399, MTT 390 and RAL 328 for Secondary Education)

4. **Mathematics Secondary Education majors must earn 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)

5. **Mathematics Secondary Education majors must earn 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:

   c. Praxis Core Basic Skills Test passing score (or equivalent)
   d. 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, Statistics, and Data Science 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 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 "Mathematics options" or "Statistics options" listed in the major requirements under "Courses in the major."

● 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. Students given permission to waive a course are required to replace it with an upper-level (300 or 400) major course.

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 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 often during the Summer Sessions.

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. Two of these course units must be MAT courses at the 400-level.

Additional Required Correlates (two course units): 1) CSC 220/Computer Science I;

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) or First Year Writing (FYW) 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
Foreign 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
FYW 102/First Year Writing (if not exempted)**	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 liberal learning courses.

***It is recommended that students exempted from these courses take other liberal learning 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 (three course units): 1) CSC 220 and CSC230; or CSC250 (with prior permission); or CSC220 and MAT341 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) or First Year Writing (FYW) 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
Foreign 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
FYW 102/First Year Writing (if not exempted)**	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 liberal learning courses.*

****It is recommended that students exempted from these courses take other liberal learning 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: Statistics

Requirements for the Major: Please see above for program retention and graduation requirements. Statistics graduates need to have a strong underpinning in mathematics in addition to acquiring all the necessary statistical knowledge and skills. The 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 statistics options chosen from the following courses

STA 303/Design of Experiments	1 course unit
STA 304/Sampling and Non-Parametric Statistics	1 course unit
STA 306/Applied Multivariate Analysis	1 course unit
STA 307/Data Mining and Predictive Modeling	1 course unit
STA 314/Statistical Quality Control	1 course unit

STA 318/Operations Research	1 course unit
STA 404/Computational and Bayesian Statistics	1 course unit

Two additional options courses which can be chosen from any MAT/STA courses at the 300/400-level	2 course units

Additional Required Correlates

CRI 215/Data Management and Analysis	1 course unit
Any two natural science courses from the list approved by the Mathematics and Statistics department. One must have a lab component	2 course units

Suggested First-Year Course Sequence

Fall

First Year Seminar (FYS) or First Year Writing (FYW) 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
STA 215/Statistical Inference	1 course unit

Spring

MAT 128/Calculus B	1 course unit
FYW 102/First Year Writing (if not exempted)**	1 course unit
MAT 200/Proof Writing through Discrete Mathematics	1 course unit
Foreign Language (if not exempted)***	1 course unit
Liberal Learning 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 liberal learning courses.

***It is recommended that students exempted from these courses take other liberal learning courses. Note: Chinese 151 and 152, Japanese 151 and 152 (offered annually) 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 (CURRENTLY NOT ACCEPTING APPLICANTS)

Requirements for the Major: Please see above for program retention and graduation requirements. Data Science graduates need to have a strong underpinning in mathematics, statistics, and computer science. The Data Science 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: 12.5 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 341/Computational Mathematics	1 course unit
STA 215/Statistical Inference	1 course unit
STA 305/Regression Analysis	1 course unit
STA 306/Applied Multivariate Analysis	1 course unit
STA 307/Data Mining and Predictive Modeling	1 course unit
STA 370/Statistics Software Development	1 course unit
STA 404/Computational and Bayesian Statistics	1 course unit
STA 498/Capstone	1 course unit

Two additional options courses which can be chosen from any
    MAT/STA courses at the 300/400-level and CSC 315, CSC 335   2 course units

Additional Required Correlates   3 course units

    CSC 220/ Computer Science I (Computational Problem Solving), and CSC 230/ Computer Science II (Data Structures) are required.
    Any one natural science course with a lab from the list approved by the Mathematics and Statistics department

Suggested First-Year Course Sequence

Fall

First Year Seminar (FYS) or First Year Writing (FYW) course	1 course unit
MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 127/Calculus A (if not exempted)*	1 course unit
Liberal Learning/Foreign Language (if not exempted)**	1 course unit
CSC 220/Computational Problem Solving I	1 course unit

Spring

MAT 128/Calculus B	1 course unit
MAT 200/Proof Writing through Discrete Mathematics	1 course unit
CSC 230/ Computer Science II (Data Structures)	1 course unit
FYW 102 (if not exempted)/Liberal Learning/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 liberal learning courses.

***It is recommended that students exempted from these courses take other liberal learning courses. Note: Chinese 151 and 152, Japanese 151 and 152 (offered annually) 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 <u>Department of Educational Administration and Secondary Education</u>.

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, liberal learning, 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, as well as have a Praxis Core Basic Skills Test passing score (or equivalent). 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, pass edTPA in their certification area, 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 his or her 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 twelve mathematics/statistics course units, and a 0-course-unit orientation. The twelve course units will consist of ten 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 310/Real Analysis	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	1course unit
and two MAT/STA options which can be any MAT/STA courses at the 300/400 level	2 course units

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 103/Social and Legal Foundations of Special Education	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

CSC 220/Computer Science I: Computational Problem Solving	1 course unit
One 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

FYW 102/First Year Writing or FYS 1XX/First Year Seminar (LL)	1 course unit
MAT 099/Orientation to Mathematics and Statistics	0 course unit
MAT 127/Calculus A*	1 course unit
CSC 220/Computer Science I	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
FYS 1XX/First Year Seminar or other Liberal Learning 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

FYW 102/First Year Writing or FYS 1XX/First Year Seminar (LL)	1 course unit
MAT 099/Orientation to Mathematics and Statistics	0 course unit
MAT 127/Calculus A*	1 course unit
CSC 220/Computer Science I	1 course unit
SPE 103/Social & Legal Foundations of Special Education	1 course unit

Spring

MAT 200/Proof Writing through Discrete Mathematics	1 course unit
MAT 128/Calculus B	1 course unit
FYS 1XX/First Year Seminar or other Liberal Learning course	1 course unit
EFN 299/Schools, Communities, and Culture	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 Urban Secondary Education

Fall

FYW 102/First Year Writing or FYS 1XX/First Year Seminar (LL)	1 course unit
MAT 099/Orientation to Mathematics and Statistics	0 course unit
MAT 127/Calculus A*	1 course unit
CSC 220/Computer Science I	1 course unit
SPA 101	1 course unit

Spring

MAT 200/Proof Writing through Discrete Mathematics	1 course unit
MAT 128/Calculus B	1 course unit
FYS 1XX/First Year Seminar or other Liberal Learning course	1 course unit
EFN 299/Schools, Communities, and Culture	1 course unit
SED 099/Secondary Education College Seminar	0 course unit

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

Mathematics Major: Math Teaching-Teacher Preparation for Elementary, Early Childhood, Urban, Deaf and Hard of Hearing, and Special 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, liberal learning, 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, as well as have a Praxis Core Basic Skills Test passing score (or equivalent). 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, pass edTPA in their certification area, 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 his or her 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/Elementary, Early Childhood, Urban Deaf and Hard of Hearing, and Special Education students will be required to take a **minimum** of eleven mathematics/statistics course units, and a 0 course unit orientation. Eleven course units will consist of **ten required** course units, and a MAT/STA option:

MAT 099/Orientation to Mathematics and Statistics	0 course units
MAT 105/Mathematical Structures & Algorithms for Educators	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 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 310/Real Analysis	1 course unit
MAT 351/Geometry	1 course unit
STA 216/Statistical Inference and Probability	1 course unit
One MAT/STA option which can be any MAT/STA course at the 300/400 level	1 course unit

Quantitative Reasoning Requirements

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

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- of 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/Statistics or Statistical Inference	1 course unit
STA 305/Regression Analysis	1 course unit

Any three courses from the following list:	(3 course units)
Any STA course at the 300 or 400 level	1 course unit
MAT 316/Probability	1 course unit
MAT 317/Linear Programming	1 course unit

TOTAL: 5 COURSE UNITS

A minimum of three course units for the statistics minor must be earned at The College of New Jersey. Only courses with earned grades of C- or higher taken at TCNJ can be used to fulfill the requirements for the minor. Transfer courses require a grade of C or higher. Students intending to take Independent Study or Independent Research courses should first seek permission from the Statistics Program Coordinator.

Actuarial and Financial Risk Studies Minor

For the Actuarial and Financial Risk Studies Minor, a student must complete the prerequisites of MAT 125 or 127, MAT 128, MAT 200 and STA 215, and 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
STA 305/Regression Analysis OR ECO 231/Applied Business Statistics	
Gives VEE-Applied Statistics credit	1 course unit
MAT 316/Probability	1 course unit
STA 410/Mathematical Statistics	1 course unit

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

For Statistics Specialization: Students will select one course from Group A, which are all <u>required</u> in the Statistics specialization, and double-count this course towards the Minor. They will then take four courses listed in Group B.

For Business Majors: Students will choose one course from Group B (which will be the double-counting course), and the four courses from Group A.

For Mathematics Majors: Students may choose 5 courses from Groups A and B but it is highly recommended that MAT 316 and STA 410/MAT 318 are among those selected.

For Other Majors: Selections from Groups A and B as advised.

Note: While only ECO 102 is listed in Group B, it is recommended that all students take ECO 101/*Principles of Microeconomics* as an elective in order to obtain VEE-Economics credit. While only FIN 201 is listed in Group B, it is recommended that students also take ACC 201 as an elective in order to receive VEE-Finance-Accounting credit. A grade of B- or higher is required for all VEE credits.