October 2015

**Spring 2016 Advising Newsletter  
Department of Mathematics and Statistics**

Dear Majors and Minors in the Department of Mathematics and Statistics,

Registration for Spring 2016 classes will start November 3rd. We cannot emphasize enough the importance of meeting with your advisor to discuss your academic plans, progress, and career goals. To encourage you, every student who meets with their advisor will be entered to win a **$25 gift card** from the bookstore. To enter the raffle, please pick up an entry form when you meet with you advisor. Fill out the information and drop the form into the box in the department office. We’ll draw and announce the winner once registration is over. Your advisors should be contacting you to arrange a time to meet, but you can also reach out to your advisor to schedule an appointment. Good luck in the drawing!

Here are a number of general department announcements that you should be aware of:

1. *Waiting Lists.* The Department will again have a waiting list for all closed classes. Once your registration time opens up, if a class is closed, you should fill out the Google wait list form (the link is at the top right of our web site). As students change courses, and spots open up in closed classes, the Department will fill the spots with students from the wait-list. The wait list should be used only when there is a closed section that you need to enroll in and there is no open section that fits your schedule.
2. *Seat Reservations*: Some courses, such as MAT 128, MAT 229, and MAT 326, have seat reservations to help ensure that students from different specializations and majors can take the course. At registration, a course might be listed as open, but because of seat reservations, PAWS might not let register for the course. If you experience this, please try to register for another section of the course. If none fit your schedule, please let us know by filling out the waitlist. We will do our best to see if the problem can be solved.
3. *Differential Equations.* All students considering the Applied Mathematics specialization should take MAT 326: Differential Equations as early as possible in their college career, and if possible, no later than the end of their sophomore year. We have reserved seats in the course for sophomore math majors (any specialization).
4. *Capstone Courses.* All senior non-education Mathematics and Statistics majors are required to complete a capstone course (MAT/STA 498). These courses are only offered in the Spring semester. Students graduating in Fall 2016 will need to take the capstone course in the Spring 2016 semester.   
    Math secondary education students take the capstone course SED 498 that accompanies their student teaching experience MTT 490. This can be done in either semester, but all major requirements must be completed before student teaching and the seminar requirement above must also be fulfilled.
5. *Departmental Honors*. We would like to encourage more of our majors to consider earning departmental honors. Departmental honors are awarded by our department at graduation and appear on one’s transcript. They are independent of the College’s Honors Program, and the Latin honors (summa cum laude, …) awarded at graduation. To earn departmental honors, students must have a 3.5 GPA in mathematics and statistics courses and complete the following:
   * A student must engage in independent research during their junior or senior year. The student should successfully complete an Independent Research 493 course during a semester they spend on-campus, and prepare a paper which will be due the middle of their last (graduating) term.
   * A presentation (which we envision being a 40 minute talk, perhaps during a lunch period) will be given in the two week period following the submission of the paper. The members of the student's Honors Committee will be present, and be given ample opportunity to ask the students questions about their research to gauge their level of understanding.
6. *Sections of Courses*. The following list shows the currently anticipated number of sections to be offered for the upper level courses in the major. The list of all regular offerings can be found on the course offering page of our web site: <http://mathstat.pages.tcnj.edu/information-for-students/courses-2/courses/> . The math/stat options for the 2016-17 academic year have not yet been decided, but will be chosen by December.

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| *Spring 2016 Semester (# of sections)* | |
| MAT 301: Number Theory (2) | MTT 390: Methods of Teaching Mathematics  II (1) |
| MAT 305: Abstract Algebra (1) | MTT 490: Student Teaching (as needed) |
| MAT 316: Probability\* (1) | SED 498: Collaborative Capstone for Professional Inquiry. |
| **MAT 320: Complex Analysis (1)** |  |
| MAT 326: Differential Equations (2) | STA 270: Topics in Statistics (Financial Mathematics) |
| MAT 351: Geometry (1) | **STA 304: Sampling and Nonparametric Statistics (1)** |
| **MAT 370-01: Topics in Mathematics\* (Computational Mathematics)** | **STA 307: Data Mining (1)** |
| **MAT 370-02: Topics in Mathematics (Topics in Mathematical Logic)** | STA 498: Statistics Capstone (1) |
| **MAT 453: Seminar in Analysis** | |
| MAT 498-01: Applied Mathematics Capstone (1) | |
| MAT 498-02: Liberal Arts Mathematics Capstone (1) | |

***BOLD*** *= A course not offered every year.  
 \*= an Applied Mathematics Options course (Probability and Computational  
 Mathematics are the two Applied Math Options offered in Spring 2016.*

1. *Student Advisory Board and Suggestion Box.* The Student Advisory Board is composed of the six majors: Rose Costanzo, Siddhi Desai, Alana Huszar, Erik Johnson, Mary Jo Mikhail, and Star Kontogiannis. These students represent all of the department’s majors and specializations and meet with the chair and associate chair twice a semester to discuss issues of concern. Suggestions can be sent to the Student Advisory Board at mathsab@tcnj.edu. We also have a suggestion box in the department office (a green box labeled “Suggestion Box”).

We wish you a successful registration session. Please write or see us if you have any questions!

Sincerely,

Professor Thomas Hagedorn Professor Cathy Liebars  
Chair Associate Chair  
Department of Mathematics and Statistics Department of Mathematics and Statistics

**Course Descriptions for MAT/STA courses not offered every semester**

**MAT 320: Complex Analysis:** *(Dr. Papantonopoulou)*This course is a Calculus course but unlike the previous calculus courses you have taken we will be studying complex numbers and functions of complex variables. The course will start with the complex plane and arithmetic of complex numbers. Then we will start talking about complex functions, limits, continuity, analytic functions, and the Cauchy- Riemann equations. We will continue with exponential and logarithmic complex functions, trigonometric and hyperbolic complex functions. We will study complex integrals and the Cauchy-Goursat theorem . We will prove the Fundamental Theorem of Algebra, we will study Taylor and Laurent series, residues and the residue theorem and its consequences. We will end the course with the topic of conformal mapping.

As in all my classes, there will be a homework assignment every week and students will be quizzed every week on the assignment. In addition there will two in class tests in addition to the final. If you have any questions on the course, please feel free to drop by my office (M 5pm and Wed 6pm). *Prerequisites*: MAT 229.

**MAT 370-01: Computational Mathematics:** *(Dr. Conjura)*The focus of the course will be on computer programming to implement solutions to mathematical problems. For problems related to financial mathematics we will be using the software platform of Excel/VBA. For problems based on topics covered in Calculus, Discrete Math and Linear Algebra we will be using Mathematica. *Prerequisites*: MAT 205 and CSC 220.

**MAT 370-02: Topics in Mathematical Logic:** *(Dr. Alves)* This course will serve as an introduction to different branches of mathematical logic. We'll touch on model theory (with completeness and incompleteness theorems and general introduction to models of theories), set theory (discussing axiomatic set theory and the continued search for additional axioms), and recursion theory (discussing computability and decidability). For each area we'll have a formal introduction to the subject followed by discussion of important results without all the necessary machinery to derive them. The goal is to introduce students to significant results in mathematical logic and whet their appetite to investigate one or more of these areas further. *Prerequisites*: MAT 200 and one of the courses MAT 305, MAT 310, or MAT 405.

**MAT 453-01: Seminar in Analysis**: *(Dr. Kardos)* In this course you will continue to build an appreciation for the many uses of the limit concept, from studying series, sequences and series of functions to measure and a deeper study of integration. We will provide a certain amount of historical perspective to motivate abstract theories by difficult problems they were intended to solve. We will avoid generalizations for their own sake and proofs that appear magical. Instead, we will stay with the concrete, motivate proofs and draw lots of pretty pictures. Our goal is to focus our attention on paradoxical examples that give real analysis its inherent fascination: bounded curves with infinite length, nowhere differentiable continuous functions, non-measurable sets.   
The course provides the necessary background for a graduate course in analysis. *Prerequisites*: MAT 310.

**STA 304: Sampling and Nonparametric Statistics** *(Dr. Holmes)*: This course introduces students to the use of sampling theory, the design and analysis of sample surveys, and robust statistical tests that are applicable in a wide range of real-world applications. Topics include: stratified sampling, cluster sampling, quota sampling, questionnaire design, and k-sample tests for paired and unpaired data *Prerequisites*: STA 215

**STA 307: Data Mining and Predictive Modeling** (*Dr. Ochs*): An introduction to data mining, focusing on classification and clustering.  Classification topics include traditional statistical classifiers and new computational methods, such as random forests and support vector machines.  Clustering topics include the use of different methods, metrics, and ensembles. *Prerequisites:* (CSC220 or CRI215) and STA215.