

## Fall 2013 Advising Newsletter Department of Mathematics and Statistics

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

Registration for Spring 2014 classes will take place November 5-15 and advising has already begun. We cannot emphasize enough the importance of meeting with your advisor to discuss your academic plans, progress, and career goals. To encourage you meeting with your advisor, every non-graduating student (so seniors graduating this Fall aren't eligible, sorry!) 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 off in 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. *Student Advisory Board and Suggestion Box.* The Student Advisory Board is composed of the six majors: Kathryn Gausz, Alana Huszar, Evan Levy, Ryan Manneimer, Matthew Rusay, and Beth Sweeney. These students represent all of the department's majors and specializations and meet with the co-chairs twice a semester to discuss issues of concern. Suggestions can be sent to the Student Advisory Boards at [mathsab@tcnj.edu](mailto:mathsab@tcnj.edu). The department also has a suggestion box in the department office (a green box labeled "Suggestion Box") where you can also make suggestions.
2. *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.
3. *Differential Equations.* All students in the Applied Mathematics specialization, and all students considering switching to the Applied Mathematics specialization should take MAT 326: Differential Equations as early as possible in their college career. It should be taken no later than the end of their sophomore year. We have some reserved seats in the course for sophomores majors.
4. *Capstone Courses.* All senior Mathematics and Statistics majors are required to complete a capstone course (MAT/STA/SED 498). The MAT/STA 498 courses are only offered in the Spring semester. Non-education students who expect to graduate in Fall 2014 will need to take their capstone course in the Spring 2014 semester. Please remember that one of the prerequisites for the capstone is to attend four seminar/colloquium presentations in your junior and senior years prior to taking the capstone course.

Applied Mathematics seniors should enroll in MAT 498-01 and Liberal Arts Math Specialization seniors should enroll in MAT 498-02. Statistics seniors should enroll in STA 498. Mathematics Secondary Education seniors should enroll in SED 498-01.

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. *Seat Reservations:* Some math 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 open, but because of seat reservations, you might not be able to 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.
7. *Sections of Courses.* The following list shows the currently anticipated number of sections for the upper level courses in the major. The list of all regular offerings is at <http://mathstat.pages.tcnj.edu/files/2011/06/CourseOfferingsS12revision.xls>.

The courses listed in bold are courses that were not offered during the current 2012-13 year. Please take advantage of the opportunity to take them! Descriptions can be found at the end of this newsletter.

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| <i>Spring 2014 Semester (# of sections)</i>    |
| MAT 301: Number Theory (2)                     |
| MAT 305: Abstract Algebra (1)                  |
| <b>MAT 317: Linear Programming* (1)</b>        |
| MAT 316: Probability* (2)                      |
| MAT 320: Complex Analysis (1)                  |
| MAT 326: Differential Equations (2)            |
| MAT 351: Geometry (1)                          |
| <b>MAT 453: Seminar in Real Analysis (1)</b>   |
| <b>MAT 454: Seminar in Applied Mathematics</b> |

**(Partial Differential Equations)\* (2)**

MAT 498: Capstone (2)

MTT 390: Methods of Teaching Mathematics  
II (1)

MTT 490: Student Teaching (4)

**STA 303: Design of Experiments (1)**

**STA 307: Data Mining and Predictive  
Modeling (1)**

STA 498: Capstone (1)

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

Sincerely,

Professors Hagedorn and Liebars

Co-Chairs of the Department of Mathematics and Statistics

**Mathematics and Statistics Course Descriptions**  
(for courses not offered during 2012-13 academic year)

**Spring 2014 Semester:**

1. *MAT 317: Linear Programming.* Prof. Thayer.

*Prerequisites:* MAT 205, and MAT 127 or MAT 125

*Description:* Linear Programming deals with the problem of maximizing or minimizing a linear function subject to a set of linear constraints. Areas as diverse as finance, the military and medicine all extensively exploit the mathematical techniques and theory of linear programming. The field is important to many businesses because it allows complex problems to be represented in the form of mathematical models.

This course is an introduction to the theory and applications of linear programming. Selected topics include: the simplex method for solving a linear program (LP), the geometry of LPs, variants of the simplex method, constructing mathematical models using LPs, duality theory, sensitivity analysis, integer programming, transportation and trans-shipment models, network models, program management models, and solving LPs using modern software packages (Excel, LINDO, LINGO, AMPL or MATLAB). Connections to Linear Algebra will be highlighted where relevant.

2. *STA 303: Design of Experiments.* Prof. Holmes.

*Prerequisites:* STA 215.

*Description:* An introduction to problems and techniques inherent to the design and analysis of experiments. There are broad applications across numerous disciplines in the sciences and the humanities. Topics include: analysis of variance, blocking, general factorial models, nested designs, confounding and fractional replication. A statistical software package will be used throughout the course (SAS, SPSS or MINITAB).

3. *STA 307: Data Mining and Predictive Modeling.* Prof. Ochs.

*Prerequisites:* BIO 352 or ECO 231 or MAT 316 or PSY 303 or (CSC 320 and STA 215).

*Description:* An introduction to Data Mining and Predictive Modeling. Topics include decision trees, link functions, logic regression, neural networks, TreeNet, support vector machine, text mining, association rules (market basket analysis), and link analysis.

4. *MAT 453: Seminar in Analysis (Topic: Real Analysis II).* Prof. Kardos.

*Prerequisites:* MAT 229 and MAT 310.

*Description:* In this course we continue to explore deeper properties of real functions and the real line. We will also continue to work with limit processes by exploring derivatives, sequences and series of functions and the concept of the definite integral.

5. *MAT 454: Seminar in Applied Mathematics (Topic: Partial Differential Equations).* Prof. Fong

*Prerequisites:* MAT 229 and MAT 326.

*Description:* In this course we will begin by studying series solutions and Laplace Transforms, two topics that may have been covered briefly in MAT 326 - Differential Equations. From there, we will explore Fourier series, series that are used to express functions as sums of trigonometric functions. These series will be used in our analysis of partial differential equations, differential equations that contain partial derivatives of multivariable functions. There will be an in-depth study of three classic partial differential equations – the wave equation, the heat equation, and Laplace's equation. The heat equation describes heat flow through a wire whose ends are kept at a constant temperature. The wave equation describes the motion of a vibrating string. Laplace's equation describes steady state temperature in a region. We will study methods for determining solutions to these fundamental equations. At the end of the course we will consider numerical solutions to partial differential equations and students will be expected to approximate solutions numerically.