# Course Syllabus
# MAT 300–Mathematical Topics in Cybersecurity
# Fall 2016
# Dr. John Peter

**Course Description:** The purpose of this course is to provide students with the mathematical background that they will need as they progress through their studies, and eventually their career, in cybersecurity. The topics outlined below, although well-known in the world of mathematics, rarely appear in a single, unified exposition. The course will be taught from the point of view of a mathematician, but will draw as frequently as possible on relevant examples from cybersecurity. In particular, the theoretical aspects of the mathematics will be discussed, although not in tremendous detail. The focus will be on developing the material through relevant examples.

**Course Learning Goals:**

- In accordance with the Program Learning Goals of the Mathematics Department, the student will demonstrate an ability to formulate and solve mathematical problems and to communicate mathematics in written form.
- *Set Theory & Logic:* Sets, operations with sets, (bi)conditionals, truth tables, quantifiers, functions, countability
- *Modular Arithmetic:* operations with integers modulo $n$, congruence classes, division algorithm, Euler's theorem, Chinese Remainder theorem
- *Number Systems in Different Bases:* general theory, binary, hexadecimal
- *Cryptography:* Public-Key Cryptography (RSA cryptosystem and possibly others)
- *Combinatorics & Graph Theory:* permutations, combinations, basic graph theory, routing problems, Euler's theorems

**Class Meetings:** Tuesday & Thursday from 1:00pm to 2:15pm in B1 Hubbard

**Required Text:** There is no required textbook. The instructor will be putting together a set of notes that will be distributed to the students as the class progresses.

**Contacting me:** EMAIL: jwpeter@utica.edu (The best way to contact me)
OFFICE PHONE: 315-792-3730

**Office/Hours:** Room 257 White Hall
Monday from 11:30AM to 12:30PM
Tuesday & Thursday from 9:00AM to 10:00AM
*or* By Appointment (made either in person or by email)

**Coursework/Weights:**

| Assessment | % of Final Grade |
|---|---|
| Paticipation | 5% |
| Weekly Homework | 15% |
| Project on the Phi function | 5% |
| Midterm Exam 1 | 25% |
| Midterm Exam 2 | 25% |
| Final Exam | 25% |

**Final Exam Date/Time:** Tuesday December 13 at 11:30am

**NO MAKE-UP WORK WILL BE GIVEN.**

**Grading:** The grading scale will be *no worse* than:
90 – 100% = A/A- 70 – 79% = C+/C/C- Below 60% = F
80 – 89% = B+/B/B- 60 – 69% = D+/D

**Course Webpage:** https://www.utica.edu/faculty_staff/jpeter/mat300f16.cfm

**Secrets to success in this course:**

- Do lots of problems . . . homework and more!
- Come to class
- Read the book
- ASK QUESTIONS!

**Calculators:** You may find a graphing calculator useful for a number of topics that we cover. However, everything that will appear on exams can be done without one! Calculators will be permitted occasionally on assessed material, depending on their enhancement of the specific topic.

**Attendance:** It is mandatory that I keep track of your attendance. An attendance sheet will be available for you to sign at the beginning of each class. Your attendance

will count for 5% your grade (The "participation" grade). YOU ARE EXPECTED TO ATTEND EVERY CLASS PERIOD. In the event that you miss class (or are mentally absent from class!) it is your responsibility to keep up with all announcements, syllabus adjustments, and/or policy changes made during scheduled class time and/or sent to you via your Utica College email. Please make sure that your Utica College email is functioning properly, and make every effort to contact me using your Utica College email address (as opposed to gmail, yahoo, etc.) to avoid confusion. If class must be canceled for some reason, you will be notified as early as possible via your Utica College email.

**Projects:** Near the middle of the semester, student's will be given a project to complete in groups (group sizes to be determined). The project will be concerned with investigating the properties of Euler's phi function. The students will have approximately two weeks to complete this project. More details will be provided as the the semester progresses.

**Classroom Etiquette:** Always keep in mind that you are in a college classroom. You and all of the people around you have paid to be here. By simply showing up for class, you are demonstrating that you take very seriously the opportunity to pursue the best learning experience possible. You are expected to treat all people in the classroom with respect, and to come to class prepared to learn. Disruptive behavior, including (but not limited to) talking, whispering, texting, eating loudly, etc. will negatively impact EVERYONE'S experience and will not be tolerated.

**Academic Honesty:** Academic honesty is necessary for the free exchange of ideas. Utica College expects academic honesty from all students and Utica College faculty are authorized to assign a wide range of academic penalties for incidents of academic dishonesty. Academic dishonesty includes both cheating and plagiarism. Plagiarism is the intentional or unintentional use of other people's ideas, words, and/or factual information as your own and without crediting the source. It doesn't matter if the words come from a book, journal article, web site, or personal letter; if somebody else originally wrote them you may not use them without attributing them to that individual by appropriately citing the source. Plagiarism also refers to self-plagiarism, or re-purposing material that you've already completed for another course or assignment. Cheating refers to giving and/or receiving unauthorized assistance in taking examinations or creating assigned and/or graded class work. Students who assist other students in, or contribute to, acts of academic dishonesty are subject to the appropriate penalties.

As mentioned above, Utica College faculty are authorized to assign a wide range of academic penalties for incidents of academic dishonesty. Depending on the nature of the offense, the penalty may include a reduced grade or grade of zero for the

particular assignment, a grade of F for the course, or the grade of "F for cheating" in the course. Incidents of academic dishonesty are reported to the Vice President for Academic Affairs who will refer any repeat offense, or any particularly egregious first offense, to the Academic Standards Committee which may recommend a more severe penalty than that imposed by the faculty member.

**Disability Disclosure:** Any student who has need of special accommodations in this class due to a documented disability should speak with me as soon as possible, preferably within the first two weeks of class. You should also contact Kateri Henkel, Director of Learning Services in the Academic Support Services Center (315-792-3032 or khenkel@utica.edu) in order to determine eligibility for services and to receive an accommodation letter. We will work with you to help you in your efforts to master the course content in an effective and appropriate way.

**Writing Proficiency:** Students are expected to possess and use adequate writing skills. All written assignments should be well–written and free of grammar, punctuation, and spelling errors. Help is available in the Writing Center located in the library.

**Math and Science Center:** Peer tutors are available in the Math and Science Center located on the first floor of the library. These services are typically available beginning in the second week of a Fall/Spring semester.

**Tentative Course Schedule**

8/30: Syllabus / Preface to Notes

9/1: 1.1

9/6: 1.2

9/8: 1.3,1.4

9/13: 1.5

9/15: 2.1

9/20: 2.2

9/22: 2.3

9/27: 2.4

9/29: **MIDTERM EXAM 1**

10/4: 2.5

10/6: 3.1

10/11: **NO CLASS - October Break**

10/13: 3.2/Assign Project

10/18: 3.3

10/20: 4.1

10/25: 4.2

10/27: Project Due

11/1: 4.3

11/3: **MIDTERM EXAM 2**
(11/4-Last Day to Withdraw)

11/8: 4.4

11/10: 4.5

11/15: 5.1

11/17: 5.2

11/22: 5.3

11/24: **NO CLASS - Thanksgiving**

11/29: 5.4

12/1: 5.5

12/6: Material Covered As Necessary

12/8: Lat Day of Class/Material Covered as Necessary

*The author of this syllabus reserves the right to change it at any time during the semester.*