COT 5615
Math for Intelligent Systems
Fall 2017

Instructor: Professor Paul Gader
Computer and Information Science and Engineering
Environmental Engineering Sciences
paul.gader@essie.ufl.edu

Teaching Assistant: Mr. Yuan

Class Room & Times: NEB 0100 & M W F 9 (4:05 - 4:55: Hope to Change!)

Offices Hours:

Paul Gader	MW	1PM	Weil 575L
	F	1PM	CSE 470
Yuan Zhou	W	10:30AM	CSE TBD
	R	1PM	CSE TBD

Prerequisites: STA 4321 (Mathematical Statistics), MAC 231 (Multivariate Calculus), MAS 3114 or MAS 4105 (Linear Algebra), or consent of instructor. Knowledge of high-level programming language such as MATLAB, Python, or R.

Overview: Intelligent Systems refers to computer algorithms that, when implemented on computational devices, exhibit behavior that appears to require intelligence. The philosophical question of whether machines can possess intellgence is not addressed. The course covers mathematics commonly used in several areas of Intelligent Systems, including Computer Vision, Biology, Cybersecurity, Big Data / Data Science, Ecology, Human Centered Computing, Image & Signal Analysis, Machine Learning, and Neural Networks/Deep Learning.

Linear Algebra is covered first with the goal of understanding diagonalization of positive-definite matrices and the relationships of such matrices and related transformations to Intelligent Systems. Following that, **Probability and Statistics** will be studied with emphasis multivariate Gaussian, or Normal, distributions as well as Mixtures of multivariate Gaussians. The Beta, Binomial, Gamma, and Dirichlet distributions will also be introduced. A brief overview of **Lagrange Multipliers and Optimization** will be given. Finally, **Information Theory** will be discussed from the perspective of intelligent systems. A full topic outline is given on the next page.

Grading: Four Tests

Test 1:	Topic 1	25%
Test 2:	Topic 2	25%
Test 3:	Topics 3 and 4	25%
Test 4:	Topic 5	25%

Homework assignments will be given and solutions will be provided. There will be opportunities to ask questions in class. Some problems from the homework will be used as test problems.

Topic Outline
All these topics are widely used in Intelligent Systems