**Engineering Analysis and Applications- ENGR 2011/2013**

1. **Course number and name:** Engineering Analysis and Applications – ENGR 2011
2. **Credits and contact hours:** 3 Credit Hours (Lecture); 1 Credit Hour (Lab)
3. **Instructor’s or course coordinator’s name:** Joseph Picone
4. **Text book, title, author, and year:**

*A First Course in Linear Algebra*, K. Kuttler. Open-Source textbook.

1. **Specific course information**
   1. **brief description of the content of the course (catalog description)**

This course introduces engineering applications of mathematical concepts through the programming environment of Matlab. Topics covered include vectors and matrices, linear matrix equations with engineering applications, eigenvalue problem, interpolation, differentiation and integration, and optimization. Engineering applications of various concepts are emphasized.

* 1. **prerequisites or co-requisites:** MATH 1042 (minimum C grade)
  2. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program:**  Required

1. **Specific goals for the course**
   1. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
2. Solve a system of linear equations using matrix algebra (PI 1.1)
3. Perform basic operations with matrices and vectors (PI 1.1)
4. Demonstrate an understanding of vector spaces, basis, and change of basis (PI 1.1)
5. Perform eigen decomposition of a matrix (PI 1.1)
6. Solve a variety of engineering problems with matrix representations using MATLAB (PI 1.2)
   1. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**

**SO (1)** An ability to identify, formulate and solve complex problems by applying principles of engineering, science and mathematics.

**ABET Performance Indicators:**

**PI (1.1)** Apply principles of engineering, science, and mathematics to formulate, model, analyze, and solve electrical engineering problems;

**PI (1.2)** Apply computational tools, design tools, and programming to solve electrical engineering problems.

1. **Brief list of topics to be covered**
2. Systems of linear equations, Row echelon form (CLO 1)
3. Introduction to vectors and matrices (CLO 2)
4. Matrix operations, Inverse matrices (CLO 2)
5. Determinants, Cramer’s rule (CLO 1, 2)
6. Vector spaces, Geometry of Linear systems (CLO 2, 3)
7. Bases of vector spaces, Change of basis, Null space (CLO 3)
8. Eigenvalues, Eigenvectors (SO 4)
9. MATLAB Programming (CLO 5)

**Student Evaluation:**

Exam No. 1 10%

Exam No. 2 10%

Exam No. 3 10%

Final Exam 20%

Quizzes 25%

Homework 25%

TOTAL: 100%

**Computer Usage:** The use of Python is required for course activities.

**Academic Rights and Responsibilities:**

Freedom to teach and freedom to learn are inseparable facets of academic freedom. The freedom to learn depends upon appropriate opportunities and conditions in the classroom, on the campus, and in the larger community. The university and the faculty have a responsibility to provide students with opportunities and protections that promote the learning process in all its aspects. Students similarly should exercise their freedom with responsibility.

<http://policies.temple.edu/PDF/99.pdf>

**Accessibility:** Any student who has a need for accommodation based on the impact of a disability should contact me privately to discuss the specific situation as soon as possible. Contact Disability Resources and Services at (215) 204-1280 in 100 Ritter Annex to coordinate reasonable accommodations for students with documented disabilities.

**Academic Integrity:**

Temple University believes strongly in academic honesty and integrity. Plagiarism and academic cheating are, therefore, prohibited. Essential to intellectual growth is the development of independent thought and a respect for the thoughts of others. The prohibition against plagiarism and cheating is intended to foster this independence and respect. Three common types of academic dishonesty are: ***Plagiarism, Violating the Guidelines of an Assignment, and Cheating on Exams.*** <http://www.temple.edu/bulletin/Responsibilities_rights/responsibilities/responsibilities.shtm>