Foundations in Linear Systems Syllabus

Course Information

Course Number: MATH 1103
Course Title: Foundations in Linear Systems
Term: Winter 2019-2020

Class Schedule:

Section	Day	Time	Location	Instructor
.01	Tuesday	7:00pm – 8:30pm	www.twitch.tv/tsogtv	Dr. Foland

Live streams will be archived for 60 days on Twitch, followed by permanent archival on Youtube. Links to these archives will be documented on TSoG eLearning.

Instructor Contact Information

Course Instructor

Steven J. Foland, PhD
Email: stevenfoland@tsogiants.org

Office Hours: Saturday, 10:00am – 12:45pm
Office hours will be held virtually on Twitch.

Use the #stream-chat (text) or #stream-calls (voice) channels on Discord to direct your questions to Dr. Foland during class or office hours.

Please use the #copernicus channel or contact Dr. Foland directly (drfoland#6708) for questions outside these times.

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Pre-requisites and Co-requisites: *MATH 1101 – Foundations in Python*

Students must be actively enrolled as TSoG.tv students to receive credit for this course.

Program Educational Objectives

The Shoulders of Giants' Mentorship students at all levels should strive to adopt an attitude of lifelong learning, build confidence as valuable members of a technical team, and embrace their responsibilities as good citizens of the scientific community.

In addition to this personal and professional growth, students at the Copernicus level are expected to develop and retain the logical, mathematical, and computational tools for solving practical problems in science and engineering.

Student Outcomes

Student Outcomes broadly represent the knowledge and skills that students are expected to attain in order to achieve the Program Educational Objectives at their current level of study. At the Copernicus level, these Student Outcomes are as follows:

C1. *Knowledge* of mathematical and computational terminology used to describe practical problems and their solutions.
C2. *Understand* the tools and techniques used to find numerical solutions of mathematical problems.
C3. *Understand* analytical solutions of simple practical problems in science and engineering.
C4. *Apply* computational tools and techniques to find approximate numerical solutions to practical problems in science and engineering.
C5. *Apply* statistics to quantitatively test a hypothesis using experimental data.
C6. *Apply* computational thinking methods to reduce simple tasks into algorithms.
C7. *Understand* modern professional communication practices.

Course Learning Objectives

Course Learning Objectives, followed by their corresponding Copernicus-level Student Outcomes, are listed below:

1. Recognize the notation and conventions used to describe matrix and vector operations. – *SO (C1)*
2. Solve simple linear systems of equations by hand using Gauss-Jordan elimination. – *SO (C3)*
3. Interpret simple, practical experiments and test hypotheses using statistical methods. – *SO (C6)*
4. Apply vector transformations in Python in both 2D and 3D space. – *SO (C4)*

Required Materials and Resources

Access to TSoG eLearning (http://elearning.tsogiants.org) required for completion of this course.

A notebook or well-structured digital note-taking method is required for success in this program.

COURSE DESCRIPTION

An introduction to linear algebra and basic trigonometric functions. Throughout this course, you will learn to solve systems of linear equations, perform matrix operations, and apply vector transformations within real-world problems. The Python programming language will be used to compute and display the results of such operations, with an emphasis placed on large systems of equations that would be impractical to solve by hand.

TENTATIVE CALENDAR

Week Of	Description
November 24th	Introduction to Linear Systems
December 1st	Matrices and Their Operations
December 8th	Gauss-Jordan Elimination
December 15th	Solutions to Linear Systems in Python
December 22nd	*Holiday Break*
December 29th	*Holiday Break*
January 5th	Practical Applications of Linear Systems
January 12th	Vectors and Their Operations
January 19th	Vectors and Basis
January 26th	Basic Trigonometric Functions
February 2nd	Vectors in Other Coordinate Systems
February 9th	Vector Transforms
February 16th	Vector Transforms in Python
February 23rd	*Review and Assessment*

COURSE COMPLETION POLICIES

- Students must complete all weekly objectives in eLearning to be eligible for assessment.
- Eligible students may participate in the course assessment at any time
- Course assessment will cover materials from all Course Learning Objectives.
- An overall score of at least 80% on all assessment criteria will be needed to receive credit for the course.
- Students may retake the assessment at the instructor's discretion if they fail to meet assessment criteria on the first attempt.

TSoG POLICIES AND PROCEDURES

The description and timelines contained in this syllabus are subject to change at the discretion of the instructor.

Communications regarding such changes will be handled via Discord and TSoG eLearning.