University Studies 3: Freshman Seminar EVOLUTION ALGEBRA

Course Details Tuesdays, 11:00-11:50 AM, DBH1420, Course Code 87554

- **Instructor Information** Bernard Russo, brusso@uci.edu. As a Professor Emeritus, I am not teaching any regular courses and I do not use my UCI office. Although I do not have formal office hours, appointments for consultation can be made by contacting me via email.
- **Course Description** A precise mathematical formulation of Mendel's laws of genetics was given in 1941 and thus introduced a new subject to mathematics: *genetic algebras*, the study of which simplified and shortened the way to understanding genetic and evolutionary phenomena.

Nowadays, non-Mendelian genetics is a basic language of molecular geneticists. The purpose of the seminar is to establish the foundation of a new algebraic framework (*evolution algebras*) to deal with non-Mendelian genetics. As the algebra involved is not usually taught in K-13, the mathematical language will be developed from scratch (and not necessarily taken too seriously).

The seminar will be primarily of interest to Mathematics majors as an application of pure mathematics to science but also to other Physical Sciences and Biological Sciences majors with an interest in mathematical methods.

Assignments No reading assignments or problem sets. Only a midterm assignment (see Grading). However, much reading material will be suggested and posted online during the quarter.

Grading Grading on an absolute scale will be determined as follows:

- 50% Attendance 10% is free; another 5% for each meeting attended
- 25% Midterm Assignment (to be determined in week 5) Collaboration permitted. 25% for turning it in (week 7)
- 25% Term Essay (of your choice) 5 to 10 pages with bibliographic references. 25% for turning it in. Collaboration NOT permitted. Due on Thursday of final exam week (Extensions are possible to as late as Tuesday of the following week). Suggestions for your topic will be made throughout the quarter.

Schedule 1. Review of Basics of Genetics, 2. Basics of Linear Algebras,

- 3. Genetic Algebras, 4. Applications to Mendelian genetics,
- 5. Evolution Algebras, 6. Applications to Non-Mendelian genetics