PCB 6555
Introduction to Quantitative Genetics

Spring 2013

PREREQUISITE	STA6166 or equivalent
INSTRUCTOR	Dr. Salvador A. Gezan Office: 363 Newins-Ziegler Hall Phone: (352) 846-0133 E-mail: sgezan@ufl.edu Office hours: TBA (or by appointment).
LECTURE TIME	Tuesday: Period 5 (11:45 am – 12:35 pm) – MAEB 229 Thursday: Periods 5 (11:45 am – 12:35 pm) – MAEB 229
COMPUTING LABS	Wednesday: Periods 10-11 (5:10 pm – 7:05 pm) – NZH 222
CLASS WEBSITE	https://lss.at.ufl.edu/
COURSE DESCRIPTION	Intended for students of all disciplines who are interested in genetic principles and biometric evaluation of characters that exhibit continuous variation in natural populations or breeding programs.
COURSE OBJECTIVES	Introduce graduate students to concepts, theory and methods in quantitative genetics with emphasis in applications for breeding programs and statistical analysis of genetic experiments.
INTENDED AUDIENCE	The course is designed for both MS and Phd graduate students in the following disciplines: plant or anuimal genetics; plant or anumal breeding; molecular gentics or biotechnology; conservation biology in botany, zoology or fisheries.
COURSE FORMAT	The course is structured as two one period lectures and one two period laboratory each week. The lectures cover concepts and theory. The laboratory section is used to reinforce and enhance the lecture material, including: (1) presentation of additional material on statistical methods and computer programs, (2) problem solving and data analysis, and (3) exams.
TEXTBOOK	No text required (notes will be provided on course's webpage). The following are some of the suggested textbooks:

WARNING

This class assumes that you have done STA6167 or an equivalent class with some strong component of linear models, and that you are familiar with basic matrix algebra. The course will assume that those topics are well known. In addition, we assume that you are self-motivated and an independent student/researched that will be

EXAMS

There will be 3 exams. No final exam will be required, but exams will be cumulative with greater emphasis in later/newer material. Each Exam will be worth 100 points. These will be implemented during laboratory time. *No make-up exams will be given under ANY circumstance!*

EXAM DATES

Exam 1 (5:10-7:10 pm) - Febreuary 5 – NZH 222
Exam 2 (5:10-7:10 pm) - March 5 – NZH 222
Exam 3 (5:10-7:10 pm) - April 5 – NZH 222

HOMEWORK

There will be 6 assignments, each will be worth 20 points, and only the best 5 will be considered for grading. Therefore, there is a total of 100 points. Students may work together in groups, but the report must be presented individually. Homework are due at 11:45 pm before the corresponding class and should be presented ON PAPER (i.e. not electronically). *Late homework will NOT be accepted!*

ATTENDANCE

Lecture and laboratory attendance is not obligatory, but success in the class (together with eligibility of bonus points and/or curving) depends, and it will depend, on attendance. In addition, some topics relevant for exams and homework that are not included in slides will be presented during class.

GRADING

Grades will be based on a total of 400 points, with 300 points from the exams and 100 points from homework. The following are the letter grades considered and their corresponding ranges

A (381-400)	A- (361-380)	
B+ (347-360)	B (334-346)	B- (321-333)
C+ (307-320)	C (294-306)	C- (281-293)
D+ (267-280)	D (254-266)	D- (241-253)
E (0-240)		

SOFTWARE

You will need a computer for some of the homework assignments. The main software used will be ASReml. This statistical package is free for educational purposes for Windows ® and it can be downloaded from: http://www.vsni.co.uk/software/asreml. Additional statistical software might be used during class to illustrate some other aspects, and this could include SAS and R.

OUTLINE OF TOPICS (Tentative)

Topic	Description
1	Population Genetics Review
2	Continuous and Discrete Variation
3	Expected Values and Breeding Values
4	Variance Components in Genetics
5	Linear Mixed Model Theory
6	REML and Estimation of Variance Components
7	Resemblance Between Relatives: Relationship Matrix
8	Animal Model
9	Parental Model: Mating Designs and Analysis
10	Genetic Gains and Response to Selection
11	Heritability and its Inference
12	Genotype by Environment and Multi-Site Analysis
13	Multi-Trait Analysis and Selection Index
14	Dealing with Binomial Responses
15	Incorporating Molecular Data: QTL and Genomic Selection

ADDITIONAL REFERENCES

Bernardo, R. 2010. Breeding for Quantitative Traits in Plants. Second Edition. Stemma Press, Minnesota.

Bourdon, R.M. 2000. Understanding Animal Breeding. Second Edition. Prentice Hall, New Jersey.

Bulmer, M. G. 1980. The Mathematical Theory of Quantitative Genetics. Oxford University Press.

Cameron, N.D. 1997. Selection Indices and Prediction of Genetic Merit in Animal Breeding. CAB International. Wallington, UK.

Falconer, D. S. and T. F. C. Mackay. 1996. Introduction to Quantitative Genetics. Fourth Edition, Longman, New York.

Hallauer, A.R.; Carena, M.J. Miranda Filho, J.B. 2010. Quantitative Genetics in Maize Breeding. Springer, New York.

Henderson, C.R. 1984. Applications of Linear Models in Animal Breeding. University of Guelph.

Kearsey, M. J. and H. S. Pooni. 1996. The Genetical Analysis of Quantitative Traits. Chapman & Hall, New York.

Littell, R. C.; Milliken, G.A.; Strop, W.W.; Wolfinger, R.D. and O. Schabenberger. 2006. SAS for Mixed Models. Second Edition. Cary, NC: SAS Institute Inc.

Lynch, M. & B. Walsh, 1998. Genetics and Analysis of Quantitative Traits. Sinaure Associate, Sunderland, Massachusetts.

Mather, K. and J. L. Jinks. 1977. Introduction to Biometrical Genetics. Cornell University Press, Ithaca, New York.

Mrode, R.A. 2005. Linear Models for the Prediction of Animal Breeding Values. 2nd Edition. CABI Publishing. Wallingford, UK.
Van Vleck, L.D.; Pollak, E.J. and Oltenacu, E.A.B. 1987. Genetics for the Animal Sciences. W. H. Freeman and Company, New York.
White, T.L.; Adams, W.T. and Neale, D.B. 2007. Forest Genetics. CABI Publishing, Wallington, UK.
White, T.L. and Hodge, G. 1989. Predicting Breeding Values with Applications in Forest Tree Improvement. Kluwer Academic Publishers. Dordrecht, The Netherlands.

UNIVERSITY POLICIES

Academic Dishonesty: All members of the University Community share the responsibility to challenge and make known acts of apparent academic dishonesty. Acts of academic dishonesty will not be tolerated and will be referred to the Student Honor Council.

Software use: All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against the University policies and rules, disciplinary action will be taken as appropriate.

University support services: Resources are available on-campus for students having personal problems or lacking clear career and academic goals which interfere with their academic performance. These resources include:

1. University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling
2. Student Mental Health, Student Health Care Center, 392-1171, personal counseling
3. Sexual Assault Recovery Services, Student Health Care Center, 392-1161, sexual counseling
4. Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling

Accommodations for students with disabilities: Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. If you have a documented disability and wish to discuss academic accommodations, please CONTACT ME as soon as possible.