

Research Techniques in Forage Evaluation – Summer 2017 **AGR 6237C - 3 credits**

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Office Hours:

My schedule is highly variable during the summer due to travel, research, and administrative responsibilities. Regular office hours are not possible. Thus, I suggest making appointments by email or text (352-213-1251) when scheduling a time to see me.

Meeting Times:

Lecture – Monday and Wednesday - 2:00-3:45
Lab – To be arranged

Course Objectives:

1. To provide a working understanding of a systematic approach to forage evaluation.
2. To acquaint students with proper terminology and methodology in forage research.
3. To provide field experiences with forage research techniques.
4. To provide experience in organizing and manipulating data sets generated in field exercises.
5. To develop the student's skills in critical evaluation of research and in designing research projects.

Required handouts and lecture materials:

Reading assignments, lecture content, and in some cases a set of discussion questions will be provided for each class period using Canvas. Material will be available well in advance of its use in class. Students are expected to prepare for each class by carefully reviewing the lecture notes, reading the assigned material, and studying the discussion questions. Lecture periods will be used primarily to address any material from the notes that is unclear (based on questions from the class) and to discuss issues raised by the instructor's questions or by the students.

References:

Lectures will be supplemented with handouts and reading material from various sources. These will be provided to you in advance of the topic being discussed in class. The following books are classical sources of information in the subject matter covered in this course.

Barnes, R. F, D. C. Clanton, C. H. Gordon, T. J. Klopfenstein, and D. R. Waldo (editors). 1970. Proceedings of the National Conference on Forage Quality Evaluation and Utilization. Nebraska Center for

Continuing Education, Lincoln, Nebraska.

Barnes, R.F, D.A. Miller, and C.J. Nelson. 1995. Forages: The science of grassland agriculture. Iowa State University Press, Ames, IA.

Fahey, G.C., Jr., M. Collins, D.R. Mertens, and L.E. Moser (eds). 1994. Forage quality, evaluation, and utilization. American Society of Agronomy, Madison, WI.

Hodgson, J., R. D. Baker, Alison Davies, A. S. Laidlaw, and J. D. Leaver (editors). 1981. Sward measurement handbook. Brit. Grassl. Soc. Hurley, Berkshire, England.

Leaver, J. D. (editor). 1982. Herbage intake handbook. Brit. Grassl. Soc. Hurley, Berkshire, England.

Mannetje, L. t', and R.M. Jones (editors). 2000. Field and laboratory methods for grassland and animal production research. CABI Publishing, New York.

Marten, G.C. 1989. Grazing research: Design, methodology, and analysis. Crop Sci. Soc. Amer., Madison, WI.

Shaw, N. H., and W. W. Bryan (editors). 1976. Tropical pasture research - principles and methods. Bull. 51, Commonwealth Agricultural Bureau (CAB) Hurley, Berkshire, England.

Wheeler, J. L., and R. D. Mochrie. 1981. Forage evaluation: concepts and techniques. American Forage and Grassland Council and CSIRO, Lexington, Kentucky and Brisbane, Australia, respectively.

Wilson, J. R. (editor). 1978. Plant relations in pastures (Proceedings of a Symposium). CSIRO, East Melbourne, Australia.

Course Requirements:

1. Attend all lectures and labs and arrive on time
2. Prepare for and participate actively in classroom discussions
3. Complete four problem sets, three of which are based on field activities
4. Participate in a group term project built around a scheme for forage evaluation
5. Complete midterm and final examinations

Grading:

There are a total of 400 possible points. The assignment of points and the basis for awarding grades are listed on the next page. The grading scale may be lowered, but you are guaranteed at least the grade shown if you obtain the appropriate number of points.

<u>Item</u>	<u>Points</u>	<u>Total points earned</u>	<u>Letter grade (grade points)</u>
Midterm	100	372 - 400	A (4.0)
Final	100	364 - 371	A ⁻ (3.67)
Problem sets (4)	100	356 - 363	B ⁺ (3.33)
Term project	<u>100</u>	348 - 355	B (3.0)
Total	400	340 - 347	B ⁻ (2.67)
		328 - 339	C ⁺ (2.33)
		300 - 327	C (2.00)

Term Project:

Each registered student will assume the role of a research scientist working as a member of a multi-disciplinary team. There will be approximately 3-4 students per team. Teams will be appointed by the instructor. The teams will be required to identify a forage-related production problem for which the most likely solution is the introduction of a new forage or forages into the existing production system. The problem should be real to a production system somewhere in the world. After identifying the problem, the group should outline the comprehensive general objectives for the overall project. Thereafter a scheme for evaluation (a series of experiments) should be identified that will lead to release to producers of a forage plant or plants that address the production problem identified.

Each team member will be responsible for at least one experiment within the overall project. Each experiment must have its own specific objectives. The general project objectives should be stated such that they cannot be met unless each of the individual experiments is completed, but each individual experiment should be such that it will result in a separate research publication (if we really were going to do the research). The individual experiments may be simultaneous and use the same resources of land, animals, etc., if this is desirable to meet objectives. On the other hand, experiments could be sequential. It may be assumed that reasonable resources of land, animals, labor, supplies and equipment are available for use by the research team. Also assume that breeding lines or forage plant introductions will be available to you at the beginning of this process, i.e., you need not get involved in plant breeding or plant collecting in this project.

We will use the following schedule for submitting elements of the term project.

Week of 4 June - Project title and objectives (rough draft)

Week of 2 July - Project title and objectives (revised draft), and outline of experiments

Week of 31 July - Completed written project due 4 August at 5 p.m.; Group oral presentation and discussion on 31 July (40 minutes total for each team; 30-minute presentation, 10-minute discussion)

The written project report should include:

1. A title page
2. A table of contents
3. A one page abstract
4. An introduction to the problem including justification and a list of experiments to be conducted

5. A statement of overall project objectives
6. A separate section for each experiment containing a list of specific objectives, materials and methods (treatments and experimental design, management practices, response variables, measurement procedures, and statistical analyses), and a general budget (categories can include equipment, materials and supplies, labor, and graduate students/postdocs; assume a working lab is in place and that you need only purchase reagents and supply technical assistance).

Your grade on the project will be based on:

1. Your team grade - 40 out of 100 points is based on the quality of the overall project (oral and written components), the degree of organization and flow of the project, the integration of all team members into the overall planning process and into the presentation of the project
2. Individual grade - 60 out of 100 points will be based on the instructor's evaluation of each individual's portion of the project as well as their oral presentation

Laboratory Problem Sets:

1. Measuring DM Harvested and Botanical Composition In Small Plots (due week of **26 June; 20 points**)
2. Calculation of Herbage Mass of Grazed Pastures Using Double Sampling Data (due week of **3 July; 20 points**)
3. Calculation of Botanical Composition of Grazed Pastures Using Double Sampling Data (due week of **10 July; 20 points**)
4. Calculation of Animal Responses in a Grazing Trial (due week of **24 July; 40 points**)

NOTE!! For all assignments, a 10% penalty will be assessed for each day that it is late. The last day for submission of the assignment is the Friday of the week indicated at 5 p.m.

Excused Absences and Make-up Exams:

Absences will be excused and make-ups scheduled in the case of illness and conflicting academic/professional activities. Except for illness, the instructor should be notified in advance. The instructor reserves the right to require documentation of the reason for the absence.

Grades and Grade Points:

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Online Course Evaluation Process:

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

Academic Honesty:

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

Use of Library, Personal References, PC Programs, and Electronic Data Bases:

These items are university property and should be utilized with other users in mind. Never remove, mark, modify nor deface resources that do not belong to you. If you're in the habit of underlining text, do it only on your personal copy. It is inconsiderate, costly to others, and dishonest to use common references otherwise.

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 university policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources:

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere

with their academic performance.
University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575,
www.counseling.ufl.edu/cwc/

Counseling Services
Groups and Workshops
Outreach and Consultation
Self-Help Library
Wellness Coaching

Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

Services for Students with Disabilities:

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. 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

0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Weekly Topic and Activity Schedule - Summer C 2017

A. Overview, Statistical Considerations, and Measurement of Plant Responses

<u>Week of</u>	<u>Topic</u>
15 May	Course Overview Lecture 1 - Terminology for Forage and Grassland Research Lecture 2 - Measures of Grassland Production Lecture 3 - Options in Agricultural Research Programs Lecture 4 - Challenges, Opportunities, and Applications of Grazing Research (Powerpoint and Crop Science Paper; no lecture outline) Lecture 5 - Field Designs in Forage Research Lecture 6 - Schemes for Forage Evaluation <u>Class Meeting Reminders</u> –regular class meetings on Monday and Wednesday; will also meet on Tuesday the 16th to make up part of time missed during week of 8 May
22 May	Lecture 7 - Evaluation of Genetic Lines Lecture 8 - Quantifying DM Harvested and Botanical Composition in Small Plot Experiments Lecture 9 - Quantifying Productivity of the Grazed Sward <u>Class Meeting Reminders</u> – regular class meetings on Monday and Wednesday
29 May	Lecture 10 - Quantifying Canopy Botanical Composition in Grazed Grasslands <u>Class Meeting Reminders</u> – Monday is a holiday; regular class meeting Wednesday; Plant Science Research and Education Unit Visit with Dr. Esteban Rios on Wednesday, 31 May @ 9-11 a.m. (transportation options will be announced)
5 June	Lecture 11 - Characterization and Evaluation of Forage Regrowth Mechanisms Lecture 12 - Post-harvest Handling of Forage Samples <u>Class Meeting Reminders</u> – regular class meetings on Monday and Wednesday; Note: Wednesday 7 June meeting will be in 3096 McCarty Hall B
12 June	Midterm Exam (Covers Lectures 1-12) – Monday 12 June 2 p.m. Field Exercise (tentatively Tuesday, 13 June a.m.) - Measuring DM Harvested and Botanical Composition in Small Plot Clipping Experiments (UF-IFAS Beef Unit) Field Exercise (tentatively Wednesday, 14 June a.m.) - Determining Herbage Mass in Grazed Swards (UF-IFAS Beef Unit) Field Exercise (tentatively Wednesday, 14 June a.m.) - Determining Botanical Composition in Grazed Swards (UF-IFAS Beef Unit)

19 June Break week between Summer A and B

B. Measuring Animal Responses on Grazed Swards

26 June Lecture 13 - Research Techniques to Describe Relationships at the Plant-Animal Interface
Lecture 14 - Response Variables in Animal Production Studies
Lecture 15 - Fixed and Variable Stocking Rate Experiments

Class Meeting Reminders – regular class meetings on Monday and Wednesday

3 July Lecture 15 - Fixed and Variable Stocking Rate Experiments (continued)
Lecture 16 - Stocking Rate and Forage Allowance

Class Meeting Reminders – regular class meetings on Monday; Note: **Wednesday 5 July visit to North Florida Research and Education Center – Marianna** with Dr. Jose Dubeux and lab group (all day; transportation provided); **Presentation:** Lecture 17: Characterizing N and C Dynamics in Grazed Grasslands Using Stable Isotopes (Dr. Dubeux)

10 July Lecture 16 - Stocking Rate and Forage Allowance (continued)
Lecture 18 - Interrelationships Among Forage Nutritive Value, Forage Quantity, and Animal Performance (continued)

Class Meeting Reminders – regular class meetings on Monday and Wednesday

17 July Lecture 19 – Calculation of Animal Responses in Grazing Trials
Lecture 20 - Experimental Design and Errors in Grazing Trials
Lecture 21 - Weighing Errors in Liveweight Gain Experiments on Pasture

Class Meeting Reminders – regular class meetings on Monday and Wednesday

24 July Lecture 22 - Measuring Intake on Pasture
Lecture 23 - Supplementation Trials on Pasture

Class Meeting Reminders – regular class meetings on Monday and Wednesday

31 July **Team Project Presentations (40 minutes per team; plan on class extending long on this day, perhaps 2-5:00 p.m.)**

Final Exam – 2 August at 2 p.m. (Lectures 13-23)