

Research Techniques in Forage Evaluation – Summer 2015 **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 phone as the best options for scheduling a time to see me.

Meeting Times:

Lecture – Tuesday and Thursday: 2:00-3:45 p.m.
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 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 will be a total of 400 possible points. The assignment of points and the basis for awarding grades is 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</u>	<u>Grade (grade points)</u>
Midterm	100	372 - 400	A (4.0)
Final	100	364 - 371	A ⁻ (3.67)
Problem sets	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. 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 collecting in this project.

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

Week of 9 June - Project title and objectives (rough draft)

Week of 7 July - Project title and objectives (final draft), and outline of experiments

Week of 4 August - Completed written project; Group oral presentation and discussion (one hour total for each team)

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 listing of specific objectives,

materials and methods (treatments and experimental design, management practices, response variables and 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 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 (instructor) - 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 **16 June**)
2. Calculation of Herbage Mass of Grazed Pastures Using Double Sampling Data (due week of **23 June**)
3. Calculation of Botanical Composition of Grazed Pastures Using Double Sampling Data (due week of **30 June**)
4. Calculation of Animal Responses in a Grazing Trial (due week of **28 July**)

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 Thursday of the week indicated.

Excused Absences and Make-up Exams/Quizzes:

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/scct/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 2015

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

<u>Week of</u>	<u>Topic</u>
12 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 - Field Designs in Forage Research
29 May	Lecture 5 - Schemes for Forage Evaluation Lecture 6 - Evaluation of Genetic Lines Lecture 7 - Quantifying DM Harvested and Botanical Composition in Small Plot Experiments
26 May	Lecture 8 - Quantifying Productivity of the Grazed Sward Lecture 9 - Quantifying Canopy Botanical Composition in Grazed Grasslands
2 June	Field Exercise - Measuring DM Harvested and Botanical Composition in Small Plot Clipping Experiments (UF-IFAS Beef Unit) Field Exercise - Determining Herbage Mass in Grazed Swards (UF-IFAS Beef Unit) Field Exercise - Determining Botanical Composition in Grazed Swards (UF-IFAS Beef Unit) Lecture 9 - Quantifying Canopy Botanical Composition in Grazed Grasslands (continued)
9 June	Lecture 10 - Characterization and Evaluation of Forage Regrowth Mechanisms Lecture 11 - Post-harvest Handling of Forage Samples Lecture 12 - Research Techniques to Describe Relationships at the Plant-Animal Interface
16 June	Lecture 12 - Research Techniques to Describe Relationships at the Plant-Animal Interface (Continued) Midterm Exam (Covers Lectures 1-11)

B. Measuring Animal Responses on Grazed Swards

23 June	Lecture 13 - Response Variables in Animal Production Studies Lecture 14 - Fixed and Variable Stocking Rate Experiments Lecture 15 - Stocking Rate and Forage Allowance
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- 30 June Lecture 16 - Interrelationships Among Forage Nutritive Value, Forage Quantity, and Animal Performance
Lecture 17 - Calculation of Animal Responses in Grazing Trials
- 7 July Lecture 18 – Characterizing N and C Dynamics in Grazed Grasslands Using Stable Isotopes (Dr. Dubeux; **class will meet on Thursday 9 July only this week**)
- 14 July NO CLASS – Animal Science National Meeting in Orlando
- 21 July Lecture 19 - Experimental Design and Errors in Grazing Trials
Lecture 20 - Weighing Errors in Liveweight Gain Experiments on Pasture
- 28 July Lecture 21 - Measuring Intake on Pasture
Lecture 22 - Supplementation Trials on Pasture
- 04 August **Team Project Presentations (1 hour per team on 4 August; plan on class extending long on this day, perhaps 2-4:30 p.m.)**

Final Exam