ANS 6715: Gastrointestinal and Feed Microbiology
Fall 2017

Description
Microbiology of the rumen, hindgut, and feed; relation to livestock production and food safety.
Credits: 3
Prerequisite: ANS 5446 or permission of instructor.

Lecture
MWF, Period 3
Building 459, Room 102

Pre-recorded are lectures available for online students. Lectures will be posted on YouTube on the ANS 6715 channel (https://www.youtube.com/channel/UCY8wfiN2Yh3cK5Jv11OdYlQ).

Instructor
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Office hours: TBA, 210E Bldg 459

Text
Required: Russell JB. 2002. Rumen Microbiology and Its Role in Ruminant Nutrition. James B. Russell.
(available at http://www.ars.usda.gov/services/software/download.htm?softwareid=409)

Journal articles will also be discussed in addition to the required text. These are

1. Maia MR, Chaudhary LC, Bestwick CS, Richardson AJ, McKain N, Larson TR, Graham IA, Wallace RJ. 2010. Toxicity of unsaturated fatty acids to the biohydrogenating ruminal bacterium, *Butyrivibrio fibrisolvens*. BMC Microbiol 10:52.
2. Ze X, Duncan SH, Louis P, Flint HJ. 2012. Ruminococcus bromii is a keystone species for the degradation of resistant starch in the human colon. ISME J 6:1535-43.
3. Kebreab E, Johnson KA, Archibeque SL, Pape D, Wirth T. 2008. Model for estimating enteric methane emissions from United States dairy and feedlot cattle. J Anim Sci 86:2738-48.
4. Henderson G, Cox F, Ganesh S, Jonker A, Young W, Janssen PH, Collaborators GRC. 2015. Rumen microbial community composition varies with diet and host, but a core microbiome is found across a wide geographical range. Sci Rep 5:14567.

Grades and Grade Points
Eleven written assignments will be given and will be worth 10 points each. Four exams will be given and will be worth 100 points each. Correct answers will be provided during a class period following the assessments.

Four journal articles will be discussed. Each discussion will occupy one class, and participation will be worth 10 points for each article. Online students are encouraged to participate, but those who cannot will be given written assignments as a substitute.

Grades will be based on the total points earned as a percentage of total points possible (550). Letter grades will be assigned as follows:

Percentage		Percentage	
93 to 100	A	73 to <77	C
90 to <93	A-	70 to <73	C-
87 to <90	B+	67 to <70	D+
83 to <87	B	60 to <67	D
80 to <83	B-	<60	E
77 to <80	C+		

Grades will be posted on Canvas throughout the semester.

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

Objectives

Students will learn how to

1) Identify groups, functions, and characteristics of microbes in the gastrointestinal tract and feed for livestock, especially ruminants;
2) Apply microbiological principles to solve problems encountered during practical livestock feeding;
3) Analyze function of microbes with biological and mathematical models;
4) Critically evaluate journal articles in gastrointestinal microbiology.

Schedule

Date	Topic	Due date for assignment
21-Aug	1. Introduction	
23-Aug	2. Microbiology	
25-Aug	3. Gastrointestinal physiology	
28-Aug	4. Microbes of the rumen: Overview	1
30-Aug	5. Microbes of the rumen: Bacteria	
1-Sep	6. Microbes of the rumen: Protozoa, fungi, methanogens, viruses	
4-Sep	NO CLASS: Labor Day	
6-Sep	7. Microbes of other gastrointestinal sites: ruminant hindgut	2
8-Sep	8. Microbes of other gastrointestinal sites: humans	
9-Sep	9. Microbes of other gastrointestinal sites: other species	
13-Sep	10. Quantification	
15-Sep	**Journal article discussion 1**	3
18-Sep	**Exam 1**	
20-Sep	11. Development, fluctuation & adaptation of populations: Development	
22-Sep	12. Development, fluctuation & adaptation of populations: Fluctuation	
25-Sep	13. Development, fluctuation & adaptation of populations: Adaptation	
27-Sep	14. Degradation of feed: Polysaccharides	4
29-Sep	15. Degradation of feed: Protein	
2-Oct	16. Microbial interactions	
4-Oct	**Journal article discussion 2**	5
6-Oct	**NO CLASS: Homecoming**	
9-Oct	Exam 2	
11-Oct	17. Energy metabolism: Transport	
13-Oct	18. Energy metabolism: Fermentation pathways	
16-Oct	19. Energy metabolism: Fermentation stoichiometry	6
18-Oct	20. Growth	
20-Oct	21. Nitrogen & lipid metabolism: Nitrogen	
23-Oct	22. Nitrogen & lipid metabolism: Lipid	
25-Oct	23. Genomics & diversity: Genomics	7
27-Oct	24. Genomics & diversity: Exercise in genome analysis	
30-Oct	25. Genomics & diversity: Diversity	
1-Nov	**Journal article discussion 3**	8
3-Nov	**Exam 3**	
6-Nov	26. Rumen disorders: Indigestion	
8-Nov	27. Rumen disorders: Toxicities	
10-Nov	NO CLASS: Veteran's Day	
13-Nov	28. Manipulation of fermentation: Diet, feed, and microbial treatments	
15-Nov	29. Manipulation of fermentation: Feed additives	
17-Nov	30. Biological models & experimental techniques: Biological models	9
20-Nov	31. Biological models & experimental techniques: Experimental techniques	
22-Nov	NO CLASS: Thanksgiving	
24-Nov	NO CLASS: Thanksgiving	
27-Nov	32. Biological models & experimental techniques: Experimental techniques	
29-Nov	33. Mathematical models: Classification	10
1-Dec	34. Mathematical models: Example models	
4-Dec	35. Mathematical models: Development	11
6-Dec	**Journal article discussion 4**	
13-Dec	**Exam 4**	

Policies
Policies below are those of the University of Florida. Online students may be subject to additional or different policies at their home institutions.

Each online distance learning program has a process for, and will make every attempt to resolve, student complaints within its academic and administrative departments at the program level. See http://distance.ufl.edu/student-complaints for more details.

Attendance and Make-Up Work
Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

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.

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

- U Matter We Care, **www.umatter.ufl.edu/**

- *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/**

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.