

## ***Quantitative microbial risk assessment of pathogens in food and environmental systems***

ANS 6932, Section QMR1, Class #19178, QMRA Basic Principles, 1 credit hour

ANS 6932, Section QMR2, Class #19179, QMRA Modeling, 2 credit hours

***Class Periods:*** Tuesdays and Thursdays, 9.00 am – 1.00 pm

***Location:*** L.E. 'Red' Larson Dairy Science Building 459, 2250 Shealy Drive, Gainesville, Florida 32611; room 102

***Academic Term:*** Summer A 2021

### ***Instructor:***

Arie H. Havelaar, PhD

Office location: 2055 Mowry Road room 105; 2250 Shealy Drive Room 104I

Telephone: (352) 273- 5921(offices); (352) 359-4287 (mobile)

E-mail address: ariehavelaar@ufl.edu

Office Hours: By appointment

### ***Co-instructors:***

Nitya Singh, PhD

Office location: 2055 Mowry Road

Telephone: (314) 583-6405 (mobile)

E-mail address: nitya11@epi.ufl.edu

Office hours: By appointment

Claudia Ganser, PhD

Office location: 2055 Mowry Road

Telephone: (785) 320-0530 (mobile)

E-mail address: gancla@epi.ufl.edu

Office hours: By appointment

### ***Course Description***

Principles of microbial risk assessment modeling in food chains and the environment. Parameter estimation, model implementation and stochastic simulation in the statistical software **R**.

Foods, water, air and fomites can be contaminated by infectious disease agents (e.g., micro-organisms, viruses, protozoa). These may be introduced at different locations, originate from different reservoirs and the population sizes and properties of these agents may change throughout transmission chains. These agents can infect humans when contaminated foods or water are consumed or when there is contact with contaminated objects. In quantitative microbial risk assessment (QMRA), knowledge about the prevalence and concentration of an infectious agent in different steps of a transmission chain are combined with quantification of human behavior and dose-response relations to calculate the risk for humans to become infected and ill. The fundamentals of QMRA modeling will be taught through a combination of lectures, case studies and computer practicals.

The course is split into two modules. The first module "Basic principles of QMRA" is presented in the first two weeks of the semester and offers 1 credit hour. The second module "QMRA modeling" is presented in the next four weeks of the semester and offers 2 credit hours. Students can choose to attend only the first module or both modules.

### ***Course Pre-Requisites / Co-Requisites***

ALS 5932, STA 6166 or similar statistics course

### ***Course Objectives***

At the end of this course, students will be acquainted with the principles of microbial risk assessment modeling, related to infectious foodborne diseases. In addition, after completing this course student will be able to:

Section QMR1

- Explain the different elements of the risk analysis paradigm

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- Recognize the four steps of microbial risk assessment: hazard identification, hazard characterization, exposure assessment and risk characterization.
- Organize experimental data for statistical analysis
- Critically evaluate published QMRA studies and use the results for decision making purposes

#### Section QMR2

- Define and obtain the data necessary for constructing risk assessment models;
- Discriminate the concepts of variability and uncertainty;
- Represent microbial data by appropriate probability distributions;
- Implement different models for microbial growth and inactivation;
- Construct (modules of) microbial risk assessment models in the statistical software **R**;
- Use the models for determining the efficiency of intervention strategies.

#### **Materials and Supply Fees**

Students are expected to bring their own laptop computer. For section QMR2, a recent version of the **R** software (<http://www.r-project.org>) and **RStudio** (<http://www.rstudio.com/products/RStudio/>) should be installed.

#### **Recommended Materials**

- Knell RJ. Introductory R.  
<http://www.introductoryr.co.uk/Introductory%20R%20example%20chapters.pdf>
- Wickham H, Golemund G. R for data science.  
<https://r4ds.had.co.nz>
- Further materials will be provided during the course.

#### **Course Schedule**

Date	Topic	Assignments and due dates
ANS 6932, Section QMR1, Class #19178, QMRA Basic Principles, 1 credit hour		
May 11, 2021	Course introduction General principles of risk analysis General principles of risk assessment	
May 13, 2021	Group discussion of QMRA studies Introduction to case studies	#1. QMRA case study May 20, 2021
May 18, 2021	Data management in the microbiological laboratory	
May 20, 2021	Case study presentations	
ANS 6932, Section QMR2, Class #19179, QMRA Modeling, 2 credit hours		
May 25, 2021	Primer in statistics and R #1	
May 27, 2021	Primer in statistics and R #2	#2. Statistical distributions June 3, 2021
June 1, 2021	Statistics of microbial counts	
June 3, 2021	Fitting distributions to data	#3. Simulation and fitting June 10, 2021
June 8, 2021	Growth and inactivation modeling	
June 10, 2021	Farm-to-fork modeling	#4. Simulation model June 17, 2021
June 15, 2021	Dose-response modeling	
June 17, 2021	Risk characterization	

#### **Attendance Policy, Class Expectations, and Make-Up Policy**

All students are expected to attend class and will be monitored by signing attendance sheets. Contact the instructor before class hours in case of emergencies prohibiting class attendance.

Students will be expected to work in groups of two or three during the practicals and answer quizzes individually. Assignment 1 (section QMR1) will be assigned to groups of two or three, all assignment for section QMR2 will be answered individually.

Cell phones should be silenced in class. Reading of newspapers, working on assignments for other classes, or other activities that are not part of the class are not allowed during class time. Missed homework, missed quizzes, and missed exams will be dealt with on an individual basis. Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Additional information can be found here:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

### **Evaluation of Grades**

#### Section QMR1

<b>Assignment</b>	<b>Total Points</b>	<b>Percentage of Final Grade</b>
Attendance	10	10%
Quizzes (2)	100 each	20%
Case study presentation	100	60%
Peer evaluation	100	10%
Total		100%

#### Section QMR2

<b>Assignment</b>	<b>Total Points</b>	<b>Percentage of Final Grade</b>
Attendance	10	10%
Quizzes (4)	100 each	20%
Assignments (3)	100 each	60%
Peer evaluation	100	10%
Total		100%

### **Grading Policy**

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### ***Students Requiring Accommodations***

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

### ***Course Evaluation***

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at [gatorevals.aa.ufl.edu/students/](http://gatorevals.aa.ufl.edu/students/). Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via [ufl.bluera.com/ufl/](http://ufl.bluera.com/ufl/). Summaries of course evaluation results are available to students at [gatorevals.aa.ufl.edu/public-results/](http://gatorevals.aa.ufl.edu/public-results/).

### ***University Honesty Policy***

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### ***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. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### ***Student Privacy***

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

### ***Campus Resources:***

#### **Health and Wellness**

##### **U Matter, We Care:**

If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or (352) 392-1575 so that a team member can reach out to the student.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, and (352) 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

##### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, (352) 392-1161.

**University Police Department** at (352) 392-1111 (or 9-1-1 for emergencies), [or http://www.police.ufl.edu/](http://www.police.ufl.edu/).

#### **Academic Resources**

**E-learning technical support**, (352)-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu).  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, (352) 392-2010 or (352) 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, (352) 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus**: [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

**On-Line Students Complaints**: <http://www.distance.ufl.edu/student-complaint-process>.