**AOM4455**

**Agricultural Operations and Systems**

Spring 2024

1. **Catalog Description**: *3 credits*. Quantitative and managerial techniques for management and planning of technical resources in agriculture. Agricultural production and processing are viewed as systems, and system management and optimization tools are reviewed and applied. Applications of queuing theory, project scheduling, optimization and expert decision systems, linear programming, data and risk analysis are presented.
2. **Instructors:**

## a. Dr. Adam Watson

## Office location: 113 Frazier Rogers Hall

1. Telephone: 352-294-6740
2. Email address: [jaw7385@ufl.edu](mailto:jaw7385@ufl.edu)
3. Course site: Canvas e-Learning
4. Office hours: MWF 1:55pm – 3:50pm or by appointment

## Dr. Greg Kiker

## Office location: 291 Frazier Rogers Hall

1. Telephone: 352-294-6749
2. Email address: [gkiker@ufl.edu](mailto:gkiker@ufl.edu)
3. Course site: Canvas e-Learning
4. Office hours: MWF 2:00pm – 4:00pm or by appointment

## Dr. Clyde Fraisse

## Office location: 271 Frazier Rogers Hall

1. Telephone: 352-249-6742
2. Email address: [cfraisse@ufl.edu](mailto:cfraisse@ufl.edu)
3. Course site: Canvas e-Learning
4. Office hours: MW 2:00pm – 3:00pm or by appointment

Your professors have an open-door policy, so do not hesitate to stop by his office. If they are not in their office, please email them and the will respond shortly. IMPORTANT: When contacting your professors or teaching assistant, please allow up to 48 hours for a response, not including weekends or holidays.

1. **Teaching Assistant**

## Vinicius Cerbaro

1. Course site: Canvas e-Learning
2. Office hours: By appointment
3. **Meeting Times:** MWF 4rd Period (10:40am – 11:30am)
4. **Meeting Location**: 110 Frazier Rogers Hall.
5. **Pre-requisites:** MAC1147 or MAC1114 & MAC1140 or MAC2233 & CGS2531
6. **Course Objectives:**

Students, upon completing this course, will be able to:

1. Apply business management principles to analyze systems issues in agricultural operations.
2. Solve optimization problems using mathematical and statistical techniques
3. Categorize structured business and environmental decision-making into quantifiable frameworks to assess the role of uncertain events
4. Evaluate multiple criteria among several alternatives through a structured and defendable decision framework
5. Integrate climate and weather factors into risk assessments of production agriculture
6. **Material and Supply Fees:** None
7. **Textbooks and Software Required:**

No textbook is required for this course; however, students are expected to have and use Microsoft Office Excel and Word during the course. In addition, students should review the following to prepare them for using Excel:

<https://www.lynda.com/Excel-tutorials/Excel-Quick-Tips/530432-2.html?org=ufl.edu>

1. **Recommended Reading:**

None

1. **Course Outline:**
2. **Cost of Ownership and Time Value of Money**

1.1 Introduction

1.2 Total Cost of Ownership

1.3 Timelines

1.4 Compounding and Future Value

1.5 Discounting and Present Value

1.6 Periodic Payments

1.7 Using Microsoft Excel as a Financial Calculator

1. **Depreciation**

2.1 Introduction

2.2 Straight-line Depreciation Method

2.3 Sum of the Digits Depreciation Method

2.4 Declining Balance Depreciation Method

2.5 Deductions

2.6 MACRS

1. **Linear Programming**

3.1 Introduction

3.2 Problem Formulation

3.3 A Simple Maximization Problem

3.4 Slack and Surplus Variables

3.5 Extreme Points

3.6 Linear Programming Using Microsoft Excel

3.7 A Simple Minimization Problem

3.8 Special Cases in Linear Programming

1. **Output Decisions for Agribusiness and Operations Systems**

4.1 Introduction

4.2 Business Decisions

4.3 Costs, Cost Functions, and Marginal Cost

4.4 Revenue, Revenue Functions, and Marginal Revenue

4.5 Break-even and Profit Maximization

4.6 Deriving Functions with Regression in Microsoft Excel

1. **Systems Reliability and Risk**

5.1 Introduction

5.2 Reliability of Components

5.3 Failure Rates

5.4 Systems Reliability

5.5 Components of Series and Parallel Systems

5.6 Uncertainty and Risk

1. **Structured Decision Making**

6.1 Elements of Structured Decisions

6.2 Basic Probability

6.3 Elementary Decision Structuring

6.4 Decision Structuring with Multiple Objectives

6.5 Software for Structuring Decisions

1. **Case Studies for Multi-Criteria Decision Analysis**

7.1 New York / New Jersey Harbor – Contaminated Dredged Material Disposal

1. **Advanced Decision Analysis Concepts**

8.1 Analysis of Decisions with Uncertain Information

8.2 Decision Structuring and Software for Multiple Objectives and Uncertain Information

8.3 Heuristics and Biases in Decision Making

8.4 Prospect Theory and Framing

8.5 Scenario Analysis (if time allows)

1. **Climate Risk in Agriculture**

9.1 The growing need of climate information

9.2 Strategies to reduce climate risk in agriculture

9.3 Incorporating weather and climate forecasts into decisions

1. **Florida’s Climate and Drivers of Climate Variability in the Southeast USA**

10.1 Drivers of climate: latitude, elevation, land and water distribution, ocean currents, pressure systems, prevailing winds

10.2 Precipitation and air temperature patterns across Florida

10.3 El Niño Southern Oscillation (ENSO) effects on Florida and the SE USA

1. **AgroClimate Indices for Crop Management**

11.1 Temperature effects on crops

11.2 Growing degree days tool on AgroClimate.org

11.3 Introduction to crop phenology

11.4 Heat stress and killing degree days

11.5 Chill requirements

11.6 Chill hours accumulation tool

1. **Crop and Disease Modeling Applications**

12.1 Introduction to crop yield models

12.2 County yield tool on AgroClimate

12.3 Planting date planner tool

12.4 Disease risk models

12.5 Weather index-based crop insurance

1. **Climate Change and Agriculture**

13.1 Introduction to climate change

13.2 Greenhouse gas emissions

13.3 Potential impacts on crop production

13.4 Increasing the resilience of the agriculture industry to climate change

1. **Course Schedule**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Week** | **Date** | **Module** | **Activity/Event** | **Assignment Due** |
| 1 | 8-Jan | 1: Cost of Ownership and Time Value of Money | Introductions |  |
| 9-Jan | No Class |  |
| 10-Jan | Module 1 Lecture 1 |  |
| 11-Jan | No Class |  |
| 12-Jan | Module 1 Lecture 2 |  |
| 13-Jan | No Class | Watson Quiz 1 |
| 14-Jan | No Class | Watson Participation 1 |
| 2 | 15-Jan | 2: Depreciation | Holiday MLK |  |
| 16-Jan | No Class |  |
| 17-Jan | Module 2 Lecture 1 |  |
| 18-Jan | No Class |  |
| 19-Jan | Module 2 Lecture 2 |  |
| 20-Jan | No Class | Watson Quiz 2 |
| 21-Jan | No Class | Watson Participation 2 |
| 3 | 22-Jan | 3: Linear Programming | Activity HW1 |  |
| 23-Jan | No Class |  |
| 24-Jan | Module 3 Lecture 1 | Watson HW 1 |
| 25-Jan | No Class |  |
| 26-Jan | Module 3 Lecture 2 |  |
| 27-Jan | No Class | Watson Quiz 3 |
| 28-Jan | No Class | Watson Participation 3 |
| 4 | 29-Jan | 4: Output Decisions of Agribusiness and Operations Systems | Module 4 Lecture 1 |  |
| 30-Jan | No Class |  |
| 31-Jan | Module 4 Lecture 2 |  |
| 1-Feb | No Class |  |
| 2-Feb | Activity HW2 |  |
| 3-Feb | No Class | Watson Quiz 4 |
| 4-Feb | No Class | Watson Participation 4 |
| 5 | 5-Feb | 5: System Reliability and Risk | Module 5 Lecture 1 |  |
| 6-Feb | No Class |  |
| 7-Feb | Module 5 Lecture 2 | Watson HW 2 |
| 8-Feb | No Class |  |
| 9-Feb | No Class |  |
| 10-Feb | No Class | Watson Quiz 5 |
| 11-Feb | No Class | Watson Participation 5 |
| 6 | 12-Feb | 6: Structured Decision Making | Lecture |  |
| 13-Feb | No Class |  |
| 14-Feb | Lecture |  |
| 15-Feb | No Class |  |
| 16-Feb | Lecture |  |
| 17-Feb | No Class |  |
| 18-Feb | No Class |  |
| 7 | 19-Feb | Lecture |  |
| 20-Feb | No Class |  |
| 21-Feb | Lecture |  |
| 22-Feb | No Class |  |
| 23-Feb | Lecture | Kiker Participation 1 |
| 24-Feb | No Class |  |
| 25-Feb | No Class |  |
| 8 | 26-Feb | 7: Case Studies for Multi-Criteria Decision Analysis | Lecture | Kiker Quiz 2 |
| 27-Feb | No Class |  |
| 28-Feb | Lecture |  |
| 29-Feb | No Class |  |
| 1-Mar | Lecture | Kiker Participation 2 |
| 2-Mar | No Class |  |
| 3-Mar | No Class |  |
| 9 | 4-Mar | 8: Advanced Decision Analysis | Lecture | Kiker HW 1 |
| 5-Mar | No Class |  |
| 6-Mar | Lecture | Kiker Participation 3 |
| 7-Mar | No Class |  |
| 8-Mar | Lecture | Kiker Quiz 3 |
| 9-Mar | Spring Break | No Class |  |
| 10-Mar | No Class |  |
| 10 | 11-Mar | No Class |  |
| 12-Mar | No Class |  |
| 13-Mar | No Class |  |
| 14-Mar | No Class |  |
| 15-Mar | No Class |  |
| 16-Mar | No Class |  |
| 17-Mar | No Class |  |
| 11 | 18-Mar | 9: Climate Risk in Agriculture | Lecture | Kiker Participation 4 |
| 19-Mar | No Class |  |
| 20-Mar | Lecture | Kiker Quiz 4 |
| 21-Mar | No Class | Kiker HW2 |
| 22-Mar | Lecture |  |
| 23-Mar | No Class |  |
| 24-Mar | No Class |  |
| 12 | 25-Mar | 10: Florida's Climate and Drivers of Climate Variability in the Southeast USA | Lecture |  |
| 26-Mar | No Class |  |
| 27-Mar | Lecture |  |
| 28-Mar | No Class |  |
| 29-Mar | Lecture | Fraisse HW1 |
| 30-Mar | No Class |  |
| 31-Mar | No Class |  |
| 13 | 1-Apr | 11: AgroClimate Indices for Crop Management | Lecture |  |
| 2-Apr | No Class |  |
| 3-Apr | Lecture | Fraisse HW2 |
| 4-Apr | No Class |  |
| 5-Apr | Lecture |  |
| 6-Apr | No Class |  |
| 7-Apr | No Class |  |
| 14 | 8-Apr | 12: Crop and Disease Modeling Applications | Lecture |  |
| 9-Apr | No Class |  |
| 10-Apr | Lecture |  |
| 11-Apr | No Class |  |
| 12-Apr | Lecture | Fraisse HW3 |
| 13-Apr | 13: Climate Change and Agriculture | No Class |  |
| 14-Apr | No Class |  |
| 15 | 15-Apr | Lecture | Fraisse HW4 |
| 16-Apr | No Class |  |
| 17-Apr | Lecture | Fraisse Particiation |
| 18-Apr | No Class |  |
| 19-Apr | Presentations | Presentations |  |
| 20-Apr | No Class |  |
| 21-Apr | No Class |  |
| 16 | 22-Apr | Presentations | Presentations and Report Due |
| 23-Apr | No Class |  |
| 24-Apr | Presentations |  |
| 25-Apr | Reading Days | Reading Day |  |
| 26-Apr | Reading Day |  |
| 27-Apr | Final Exam  Week | No Class | No Final Exam in Course |
| 28-Apr | No Class |
| 17 | 29-Apr | No Class |
| 30-Apr | No Class |
| 1-May | No Class |
| 2-May | No Class |
| 3-May | No Class |

1. **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/UGRD/academic-regulations/attendance-policies/>.
2. **Course Expectations**: To be successful in this course, attendance (on time) is improtant. It is the student's responsibility to contact the instructor(s) in advance of any planned absences, and to make arrangements to make-up and complete assignments. All assignments must be typed and are due one week from when assigned. Assignments must be submitted via Canvas by 11:59 PM of due date. Assignments submitted late, but before 5:00 PM on the day following the due date, will be marked down 10 points. Assignments returned late, before 5:00 PM on the second day following the due date will be marked down 50 points. No assignments will be accepted after 5:00 PM on the third day following the due date

Our class sessions may be recorded (audio and video) for students in the class to refer back and for remote students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

1. **Grades and Grade Points:**

For information on current UF policies for assigning grade points, see the Grades and Grading Policies section of the [UF Undergraduate Catalog](https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx).

|  |  |  |
| --- | --- | --- |
|  | **Points** | **% of Final Grade** |
| **Watson** |  |  |
| Participation 5 @ 5 pts. each | 25 |  |
| Quizzes 5 @ 15 pts. each | 75 |  |
| Homework 2 @ 75 pts. each | 150 |  |
| Watson Portion Total Points | **250** | **25%** |
| **Kiker** |  |  |
| Participation 4 @ 5 pts. each | 20 |  |
| (In-class only) Quizzes 4 @ 20 pts. each | 80 |  |
| Homework 2 @ 75 pts. each | 150 |  |
| Kiker Portion Total Points | **250** | **25%** |
| **Fraisse** |  |  |
| Participation | 110 |  |
| Homework 4 @ 35 pts. each | 140 |  |
| Fraisse Portion Total Points | **250** | **25%** |
| **Project** | **250** | **25%** |
| **TOTAL** | **1000** | **100%** |

Students who have questions about their grades should contact their professor. Do not contact the TA about grades.

**A** [100.00 – 93.00%]

1. [92.99 – 90.00%]

**B+** [89.99 – 87.00%]

**B** [86.99 – 83.00%]

1. [82.99 – 80.00%]

**C+** [79.99 – 77.00%]

**C** [76.99 – 73.00%]

**C-** [72.99 – 70.00%]

**D+** [69.99 – 67.00%]

**D** [66.99 – 63.00%]

**D-** [62.99 – 60.00%]

**E** [59.99 – 0.00%]

1. **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. 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: <https://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 https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at: <https://gatorevals.aa.ufl.edu/public-results/>.
2. **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>.

1. **Software Use**: All faculty, staff and student 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.

1. **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, <https://disability.ufl.edu/>
2. **Campus Helping Services**: Students experiencing crises or personal problems that interfere with their general wellbeing 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](http://www.counseling.ufl.edu)

Counseling Services

Groups and Workshops

Outreach and Consultation

Self-Help Library

Wellness Coaching

* *U Matter We Care*, www.umatter.ufl.edu/
* [*Career Resource Center*](http://www.crc.ufl.edu/), First Floor JWRU, 392-1601

**Student Complaints:**

Residential course: <https://sccr.dso.ufl.edu/policies/student-honor-code-studentconduct-code/>.

Online course: : <https://pfs.tnt.aa.ufl.edu/state-authorization-status/#student-complaint>