

Instructor:	W. Marshall Frasier	Shuiqin Yu
Office:	B-331 Clark Bldg.	B-302 Clark Bldg
Phone:	491-6071 (office) 495-1726 (home – voicemail only)	
E-mail:	<a href="mailto:Marshall.Frasier@ColoState.Edu">Marshall.Frasier@ColoState.Edu</a>	<a href="mailto:shuiqiny@rams.colostate.edu">shuiqiny@rams.colostate.edu</a>

Office Hours: Frasier: 8:00-10:00am Wednesday, 2:00-4:00pm Thursday, or by appointment  
Yu: 4:00-5:00pm Monday or by appointment

Textbooks: *Applied Mathematical Programming Using Algebraic Systems*  
Bruce A. McCarl and Thomas H. Spreen  
Self-published. <http://agecon2.tamu.edu/people/faculty/mccarl-bruce/books.htm>

Selected readings available on the CSU Canvas site as announced.  
{<http://colostate.instructure.com>}

Description: This is a graduate-level course in applied economics. As stated in the University general catalog, this course will address “the theory and practice of optimization techniques used in economic applications with emphasis on linear and nonlinear programming.” The course will emphasize the understanding the types of economic problems where these tools are appropriate, the means to formulate models and solve them, and the interpretations of results.

Prerequisites: AREC 506 Applied Microeconomic Theory

Objectives: After completing this course, a successful student will be able to:

- 1) Understand the theory and framework of the linear programming (LP) model
- 2) Formulate, solve, and fully interpret the results from an LP model
- 3) Understand the theory and approaches to solving nonlinear programming models
- 4) Use appropriate techniques to formulate, solve, and fully interpret the results from a nonlinear programming model
- 5) Diagnose deficiencies and identify limitations in mathematical optimization models
- 6) Use appropriate mathematical programming techniques to address questions of economic significance
- 7) Understand how to incorporate risk into a mathematical programming model
- 8) Understand how to appropriately reflect temporal decisions within an optimization model

Grading Policy: Course grades will be based on problem sets, a midterm examination, a final exam, and a course project. The components will be weighted as follows:

Homework	40%	(8-10 assignments expected)
Midterm Exam	15%	(tentatively in October 2-11)
Research Project	25%	(includes presentation)
Final Exam	20%	(6:20-8:20, Thursday, Dec. 13)

Final grades will be assigned based on total point accumulations as follows: A = 90-100%; B = 80-89%; C = 70-79%; D= 60-69%; F = <60%. Requirements for each grade category may be adjusted downward but will not be raised. Pluses and minuses will be awarded at the instructors' discretion. ***IMPORTANT: To pass the course a student must receive a passing grade (D or better) on the final project. A failing grade on the final project will result in a failing grade for the course irrespective of total points earned elsewhere in the course.***

Academic Integrity: We take academic integrity seriously. At minimum, academic integrity means that no one will use another's work as their own. The CSU writing center defines plagiarism this way:

*Plagiarism is the unauthorized or unacknowledged use of another person's academic or scholarly work. Done on purpose, it is cheating. Done accidentally, it is no less serious. Regardless of how it occurs, plagiarism is a theft of intellectual property and a violation of an ironclad rule demanding "credit be given where credit is due."* Source: (Writing Guides: Understanding Plagiarism. <https://writing.colostate.edu/guides/page.cfm?pageid=311&guideid=17> Accessed, August 15, 2018)

If you plagiarize in your work you will lose credit for the plagiarized work, fail the assignment, or fail the course. Plagiarism can result in expulsion from the university. Each instance of plagiarism, classroom cheating, and academic dishonesty in general will be addressed according to CSU published policies. (See <http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/>)

Of course, academic integrity means more than just avoiding plagiarism. It also involves doing your own reading and studying. This includes regular class attendance, careful consideration of all class materials, and engagement with the class and your fellow students. Academic integrity lies at the core of our common goal: to create an intellectually honest and rigorous community. Because academic integrity, and the personal and social integrity of which academic integrity is an integral part, is so central to our mission as students, teachers, scholars, and citizens, we will ask to you sign the CSU Honor Pledge as part of completing all of our major assignments. You will be prompted to write and sign the following statement on all of your graded assignments, projects, and exams:

**"I have not given, received, or used any unauthorized assistance."**

You can visit <https://tilt.colostate.edu/integrity/resourcesFaculty/pledge/> to read more about CSU's Honor Pledge as well as finding links to a number of other resources that address academic integrity.

## Principles of Community

The Principles of Community support the Colorado State University mission and vision of access, research, teaching, service and engagement. A collaborative and vibrant community is a foundation for learning, critical inquiry, and discovery. Therefore, each member of the CSU community has a responsibility to uphold these principles when engaging with one another and acting on behalf of the University

**Inclusion:** We create and nurture inclusive environments and welcome, value and affirm all members of our community, including their various identities, skills, ideas, talents, and contributions.

**Integrity:** We are accountable for our actions and will act ethically and honestly in all our interactions.

**Respect:** We honor the inherent dignity of all people within an environment where we are committed to freedom of expression, critical discourse, and the advancement of knowledge.

**Service:** We are responsible, individually and collectively, to give of our time, talents, and resources to promote the well-being of each other and the development of our local, regional, and global communities.

**Social Justice:** We have the right to be treated and the responsibility to treat others with fairness and equity, the duty to challenge prejudice, and to uphold the laws, policies and procedures that promote justice in all respects.

## Need Help?

CSU is a community that cares for you. If you are struggling with drugs or alcohol and/or experiencing depression, anxiety, overwhelming stress or thoughts of hurting yourself or others please know there is help available. Counseling Services has trained professionals who can help. Contact 970.491.6053 or go to <http://health.colostate.edu>. If you are concerned about a friend or peer, tell someone at by calling 970.491.1350 to discuss your concerns with a professional who can discreetly connect the distressed individual with the proper resources (<http://supportandsafety.colostate.edu/tellsomeone>). Rams take care of Rams. Reach out and ask for help if you or someone you know is having a difficult time.

CSU's Student Sexual Harassment and Violence policy, following national guidance from the Office of Civil Rights, requires that professors follow CSU policy as a "mandatory reporter" of any personal disclosure of sexual harassment, abuse, and/or violence related experiences or incidents shared with the professor in person, via email, and/or in classroom papers or homework exercises. These disclosures include but are not limited to reports of personal relational abuse, relational/domestic violence, and stalking. While professors are often able to help students locate appropriate channels of assistance on campus (e.g., see the CSU Health Network link below), disclosure by the student to the professor requires that the professor inform appropriate CSU channels to help ensure that the student's safety and welfare is being addressed, even if the student requests that the disclosure not be shared.

For counseling support and assistance, please see The CSU HEALTH NETWORK, which includes a variety of counseling services that can be accessed at: <http://health.colostate.edu/>. And, The Sexual Assault Victim Assistance Team is a confidential resource for students that does not have a reporting requirement and that can be of great help to students who have experienced sexual assault. The web address is <http://www.wgac.colostate.edu/need-help-support>.

## **Course Outline**

(with tentative time allocation)

- I. Introduction (Week 1)
  - A. Modeling and Decision Analysis
  
- II. Linear Programming (Weeks 2-5)
  - A. Formulation
  - B. Solution Algorithms
  - C. Duality and Sensitivity Analysis
  - D. Basic Applications
  - E. Modeling with GAMS
  
- III. Integer Programming (Week 6-7)
  - A. Formulation
  - B. Solution Algorithms
  - C. Applications
  
- IV. Nonlinear Programming (Weeks 8-10)
  - A. Formulation
  - B. Theory of solution and algorithms
  - C. Applications (including market models)
  
- V. Risk Modeling (Weeks 11-12)
  
- VI. Time in Optimization Models-Intro to Dynamics (Weeks 13-14)
  
- VII. Project presentations (Week 15)

I have an "open door" policy for visitors in my office. You are always welcome to drop by if you have an issue that you wish to discuss with me. However, please realize that I have many other responsibilities beyond teaching this class, so I may be forced to schedule to meet with you later. I do schedule office hours each week that I set aside for meeting with students from my current courses. If at all possible, I prefer that you try to use this time to meet with me. I make every attempt to be in the office during these hours and will try to announce in class the days that I will not be available during this time.

I welcome you to this course and look forward to sharing the next 16 weeks with you. I hope that we both have a fruitful and prosperous semester. Good luck to you!

