

ISC 4223: Computational Methods for Discrete Problems

This course provides students with description of and skills required to identify requirements of a range of discrete applications arising in various science fields, a survey of methods and tools for solving such problems on computers, and a detailed study of select discrete applications in science and engineering.

The laboratory component constitutes an integral part of the course and illustrates the concepts learned in the context of several science problems.

Credit

4 semester hours

Prerequisites

MAS 3105, ISC 4304

Course Objectives

At the end of the course, the student will be able to

- Identify and compare discrete and continuous problems and methods.
- Correctly match and efficiently apply a suitable algorithm to a discrete problem.

Course Topics

The topics covered under this course broadly include

- review of discrete and continuous methods;
- review of graph theory;
- combinatorial optimization methods and linear programming.
- support vector machines.
- energy functions and annealing methods.
- genetic algorithms.
- fuzzy logic and cellular automata.
- study of discrete computational methods to anomaly detection, bioinformatics, and medical imaging.

Class Schedule and Location

Lectures: MWF 1:20 pm -- 2:10pm, 152 DSL

(health emergency virtual lecture Zoom meeting room <https://fsu.zoom.us/j/8656295843>)

Laboratory: F 3:05 pm – 5:35 pm, 152 DSL

Contact Information

Instructor: Tomasz Plewa
Office: 413 DSL
Office phone: 850.644.1959
E-mail: tplewa@fsu.edu
Office hours: by appointment.

Teaching Assistant: Pankaj Chouhan
E-mail: pchouhan@fsu.edu
Office hours: by appointment.

Class Policies

- Test dates announced at least 1 week in advance.
- No make-ups will be granted unless prior approval has been obtained from the instructor.

Homework Submission

Each homework assignment or project must be submitted as a single pdf document via email to TA (pchouhan@fsu.edu) with a copy to the Instructor (tplewa@fsu.edu).

Grading

The course grade will be based on class tests (3 in total, 40%) and computer laboratory homework assignments (60%). Because the laboratory and homework effort is substantial, no mid-term or final exams will be given.

Late homework submissions will be subject of 10% points reduction per day, with maximum of 50% points reduction. Homework submissions will be accepted through the last day of classes.

The scale for the grades will be A (90-100%), A- (87-89%), B+ (83-86%), B (77-82%), B- (73-76%), C+ (69-72%), C (63-68%), C- (59-62%), D+ (55-58%), D (50-54%), and F (<50%).

Textbooks

Required: J. C. Spall, *Introduction to Stochastic Search and Optimization: Estimation, Simulation, and Control*, Wiley, 2003.

Website

<https://canvas.fsu.edu/courses/215364>

University Attendance Policy

Excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

Academic Honor Policy

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at <http://dof.fsu.edu/honorpolicy.htm>.)

Americans with Disabilities Act

Students with disabilities needing academic accommodation should: (1) register with and provide documentation to the Student Disability Resource Center; and (2) bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class.

This syllabus and other class materials are available in alternative format upon request.

For more information about services available to FSU students with disabilities, contact the: Student Disability Resource Center

874 Traditions Way 108

Student Services Building

Florida State University

Tallahassee, FL 32306-4167

(850) 644-9566 (voice) (850) 644-8504 (TDD)

sdrc@admin.fsu.edu

<http://www.disabilitycenter.fsu.edu/>

Free Tutoring from FSU

For tutoring and writing help in any course at Florida State University, visit the Academic Center for Excellence (ACE) Tutoring Services' comprehensive list of tutoring options - see <http://ace.fsu.edu/tutoring> or contact tutor@fsu.edu for more information. High-quality tutoring is available by appointment and on a walk-in basis. These services

are offered by tutors trained to encourage the highest level of individual academic success while upholding personal academic integrity.

2022-23 Syllabus Statement on Pandemic Protocols

The CDC recommends that all individuals, even vaccinated individuals, wear proper and well-fitting masks in public indoor spaces, like classrooms, especially where social distancing is not possible and virus rates are high. The CDC assesses the infection rate in Leon County as **HIGH** (see details at <https://www.cdc.gov/coronavirus/2019-ncov/your-health/covid-by-county.html>) and continues to recommend masking in indoor public spaces, especially when social distancing is not possible.

Florida is experiencing a surge of the Omicron BA.5 variant, the most easily transmissible Covid variant to date, which is able to evade previous immunity from infection and vaccination. It is a much more transmissible variant than the original virus, the Delta variant, or even the earlier Omicron variants. It can infect even vaccinated individuals and can be spread by them to others. It poses a special threat to members of the community with underlying health conditions and family members vulnerable to the virus. The best way to protect against serious illness is to be fully vaccinated, but not everyone among us can be.

For these reasons, FSU expects each of us to continue cooperating with common-sense [public health protocols](#), including (1) getting vaccinated and boosted, (2) testing for the virus if you have symptoms, (3) staying home and away from others if you are sick (in such exceptional cases a virtual meeting room will be made available), and (4) masking in public indoor spaces to protect yourself and others whenever there is reason for concern. In our classroom together, I will wear a proper, well-fitting mask, and I invite you to join me in order to reduce the spread of BA.5 and protect the vulnerable among us.

Please remember that you should **NOT** attend class in person if you have tested positive for Covid-19 or are in quarantine.