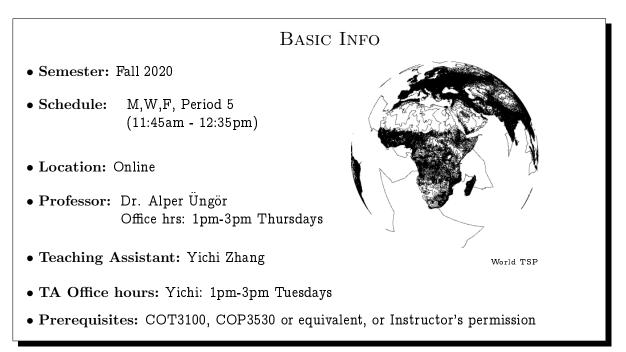# COT5405: ANALYSIS OF ALGORITHMS
Syllabus

"People who analyze algorithms have double happiness. First of all they experience the sheer beauty of elegant mathematical patterns that surround computational procedures. Then, they receive a practical payoff when their theories make it possible to get other jobs done more quickly and more economically..."
Donald E. Knuth

Basic Info

- **Semester:** Fall 2020

- **Schedule:**   M,W,F, Period 5
  (11:45am - 12:35pm)

- **Location:** Online

- **Professor:** Dr. Alper Üngör
  Office hrs: 1pm-3pm Thursdays

- **Teaching Assistant:** Yichi Zhang

World TSP

- **TA Office hours:** Yichi: 1pm-3pm Tuesdays

- **Prerequisites:** COT3100, COP3530 or equivalent, or Instructor's permission

Main Theme

The study of algorithms is aimed at creating techniques that will enable a computer to perform a certain task in an efficient manner. An *algorithm* is a set of well-defined instructions for accomplishing some task, often explained by analogy with a culinary recipe. To analyze an algorithm is to determine the amount of resources (such as time and storage) necessary to execute it. Usually the efficiency or complexity of an algorithm is stated as a function relating the input length to the number of steps (time complexity) or storage locations (space or memory complexity) required to execute the algorithm. In this course, we will study various algorithmic paradigms (such as divide-and-conquer, greedy, dynamic programming), various analysis techniques (such as worst-case, expected, approximate), various problem domains (such as searching, sorting, graph theory, geometric, and combinatorially hard) problems.

Course Material

- **Required Textbook:**

  - *Introduction to Algorithms (3rd ed)*, T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein. (MIT Press and McGraw-Hill, 2009).

- **Recommended Textbooks:**

  - *Algorithm Design.* J. Kleinberg and E. Tardos. (Addison Wesley, 2005).
  - *Computers & Intractability.* M.R. Garey and D.S. Johnson, (Freeman, 1979).

  In addition, a list of articles from the proceedings of prestigious algorithms conferences (SToC, FoCS, SoDA, APPROX, RANDOM, SoCG, LATIN, ESA) and journals (Journal of Algorithms, Algorithmica, Theoretical Computer Science, SIAM Journal on Computing, Discrete & Computational Geometry) will be given.

Coursework

Grades are based on four exams (each 20%), a project (10%), and a survey paper (10%).

- **Exams:** Online Honorlock Exams are tentatively scheduled on September 21 (Monday), October 14 (Wednesday), November 6 (Friday), December 7 (Monday) between 10 am and noon. Further guidelines will be posted on UF E-learning.

- **Survey Paper:** Students will be asked to write an original survey paper on an advanced algorithms topic. A collection of topics, each with a list 4-6 seminal papers and further guidelines will be provided by mid semester.

- **Programming Project:** Students will be asked to solve an algorithmic problem, code your solution in a programming language (C++ or Java), and write a short report on the performance of your program on a collection of input data sets.

- **Homeworks:** There will be six assignments, each consisting of five problems selected from the textbook. Solutions will be provided, however they will not be graded. The goal is to enhance your learning and help you prepare for the exams.

- **Attendance:** The course is online with pre-taped lectures. Hence no attendance is required. You are encouraged to watch the lectures in a timely-manner.

- **Grading Scale:** The following cut-off numbers are guaranteed. Final cut-offs might be slightly more lenient depending on the final grades distribution.

A	A−	B+	B	B−	C+
$[90, 100]$	$[84, 90)$	$[77, 84)$	$[70, 77)$	$[64, 70)$	$[57, 64)$
C	C−	D+	D	D−	E
$[50, 57)$	$[45, 50)$	$[40, 45)$	$[35, 40)$	$[30, 35)$	$[0, 30)$

Course Policies

- *UF's Official Online Recording Policy*: Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled 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.

- *Regrading Policy*: Requests are due by one week after each assignment grade post.

- *Make-up Policy*: Make-up exams will be given only if you have an official documentation of a valid excuse and you contact me prior to the exam.

- *Announcements:* Students are responsible following the announcements (due dates, schedule updates on exams and office hours, etc.) on UF E-learning.

- *The University's Honesty Policy:* All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a student at UF and to be honest in all work submitted and exams taken in this class and all others. Additional information on academic honesty is available at: http://regulations.ufl.edu/chapter4/4041.pdf

- *Students with disabilities* who experience learning barriers and wish to request academic accommodations should connect with the disability resource center by visiting https://disability.ufl.edu/students/ and share their accommodation letter with their instructor 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 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/.