SYLLABUS

Instructor: Dr. Charles E. Hughes
Office: HEC-247C; charles.hughes@ucf.edu; Use Subject COT6410
Class: **TR 1:30PM – 2:45PM; HEC-103;**
Office Hours: **TR 3:15PM – 4:30PM**
Texts: Course notes
http://www.cs.ucf.edu/courses/cot6410/Spring2019/Notes/COT6410NotesSpring2019.pdf
Recommended Reading:
Sipser, *Introduction to the Theory of Computation 3rd Ed*., Cengage Learning, 2013. (used in COT4210)
Garey&Johnson, *Computers and Intractability: A Guide to the Th. of NP-Completeness*, W. H. Freeman & Co., 1979.
Papadimitriou & Lewis, *Elements of the Theory of Computation*, Prentice-Hall, 1997.
Davis, Sigal&Weyuker, *Computability, Complexity and Languages 2nd Ed.*, Acad. Press (Morgan Kaufmann), 1994.
Hopcroft, Motwani&Ullman, *Intro to Automata Theory, Languages and Computation 3rd Ed.*, Prentice-Hall, 2006.
Oded Goldreich, *Computational Complexity: A Conceptual Approach*, Cambridge University Press, 2008.
Arora&Barak, *Computational Complexity: A Modern Approach*, Cambridge University Press, 2009.
Draft available at http://www.cs.princeton.edu/theory/complexity/

Rules to Abide by
- Do Your Own Work
  - When you turn in an assignment, you are implicitly telling me that these are the fruits of your labor. Do not copy anyone else's homework or let anyone else copy yours. In contrast, working together to understand lecture material and solutions to problems not posed as assignments is encouraged. Cheating on an assignment will result in an F on that assignment for the first infraction and an F for the course on the second. This can also lead to administrative action at the university level.
- Late Assignments
  - I will accept no late assignments, except under very unusual conditions, and those exceptions must be arranged with me or the GTA in advance unless associated with some tragic event.
- Exams
  - No communication during exams, except with me or a designated proctor, will be tolerated. A single offense will lead to termination of your participation in the class, the assignment of a failing grade and probable administrative action at the university level.

Grading Policy:
- Midterm – 125 points; Final Exam – 200 points
- Assignments – 75 points; Paper and Presentation – 75 points
- Extra -- 25 points used to increase weight of exams or Paper/Presentation, always to your benefit
- Total Available: About 500
- Grading will be A >= 90%, B+ >= 85%, B >= 80%, C+ >= 75%, C >= 70%, D >= 50%, F < 50%
  Minus grades might also be used if deemed appropriate.

Grading of Exams and Assignments
I will endeavor to return each exam with a week of its taking place and each assignment within a week of its due date.

Exam Weights
The weights of exams will be adjusted to your personal benefits, as I weigh the better exam higher.

The Z designation
UCF faculty members have a responsibility for your education and the value of a UCF degree, and so seek to prevent unethical behavior and when necessary respond to infringements of academic integrity. Penalties can include a failing grade in an assignment or in the course, suspension or expulsion from the university, and/or a "Z Designation" on a student's official transcript indicating academic dishonesty, where the final grade for this course will be preceded by the letter Z. For more information about the Z Designation, see http://goldenrule.sdes.ucf.edu/zgrade.

Attendance: I do not take attendance, but I expect it, and I expect you to arrive on time. If people begin arriving late or missing class as a matter of habit, I will begin having unannounced quizzes. If you have legitimate reasons for arriving late or leaving early, please inform me ahead of time, and please enter or leave the classroom as unobtrusively as reasonable. Note that attendance at academic conferences associated with your research is a legitimate reason to not attend class and, in some cases, to take an exam late or early. However, I don't want to be surprised so let me know as far in advance as reasonable.

Expected Outcomes

- You will gain an understanding of various types of computational models and their relation to each other.
- You will have a strong sense of the limits that are imposed by the very nature of computation, and the ubiquity of unsolvable problems throughout CS.
- You will understand the notion of computational complexity and especially of the classes of problems known as P, NP, co-NP, NP-complete and NP-Hard.
- You will (hopefully) come away with stronger formal proof skills and a better appreciation of the importance of discrete mathematics to all aspects of CS.

Brief Outline

Introduce Theory of Computation, including

- Notion of decision problems
  - Sets of natural numbers
  - Sets of strings over some finite alphabet (language)
  - Grammars as language generators (Chomsky Hierarchy)
- Various models of computation
  - Weak models such as finite, pushdown and linear bounded automata
  - Review of major results from automata and formal language theory
  - Turing Machines and other equivalent models
  - Deterministic versus non-deterministic models
  - Relation of models to sets/languages they recognize
- Limits of computation
  - Undecidable problems
  - Enumerable/semi-decidable problems
  - The technique of reducibility
  - The ubiquity of undecidability, including Rice's Theorem
  - The notion of semi-decidable (re) and of co-re sets
- Complexity theory
  - Order notation (this should be a review)
  - Polynomial reducibility
  - Time complexity, the sets P, NP, co-NP, NP-complete, NP-hard, etc., and the question does P=NP?
  - Various NP complete problems
- Other Topics
  - TBD

- **Important dates**
- Midterm – Tuesday, March 5 (tentative)
- Spring Break – March 11-16
- Withdraw Deadline – Wednesday, March 20
- Final – Tues., April 30, 1:00PM–3:50PM