COMP 4601 Models of Computation  
TuTh 1:00 - 2:25 PM, DH 107

Instructor: Mr. Tyler Moore, DH 247

Office Hours: Tuesday/Thursday 2:30-3:30 p.m., or by appointment

Course Description: Computer models as a basis for the understanding and analysis of programing, computation and complexity; machine models (finite-state, stack and Turing machines); biologically-inspired models (neural nets; genetic algorithms); linguistic models (grammars, lambda calculus, predicate calculi); unsolvability, universality, decidability, feasibility. Prerequisites: COMP 2701, COMP 4030


CSAB Objectives for Student Outcomes: Objectives relevant to this course include a, b, c, and j in the CSAB list for the CS curriculum.

- a. An ability to apply knowledge of computing and mathematics appropriate to the discipline.
- b. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
- c. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
- j. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

Weekly Learning Objectives:

- Week 1: Review of necessary mathematical objects
- Week 2-4: Regular languages, regular grammars, and finite automata
- Week 5-6: Context-free languages, context-free grammars, and pushdown automata
- Week 7: Introduction to Turing machines and class project objectives/guidelines
- Week 8: Spring break
- Week 9: Turing machines
- Week 10: Decidable and undecidable languages
- Week 11: Reductions and student project description presentations
- Week 12: Reductions and mapping reducibility
- Week 13: Turing reducibility and time complexity
- Week 14: Classes P and NP
- Week 15: NP-completeness

Evaluation Plan: Students will be evaluated based on their class participation, four (4) independent homework assignments, eight (8) in-class quizzes, two (2) in-class presentations, and one (1) written project report.
<table>
<thead>
<tr>
<th>Item</th>
<th>Points</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Homework</td>
<td>150</td>
<td>25%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>160</td>
<td>≈27%</td>
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<tr>
<td>Participation</td>
<td>40</td>
<td>≈7%</td>
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<tr>
<td>Progress Report</td>
<td>100</td>
<td>≈17%</td>
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<tr>
<td>Term Project</td>
<td>150</td>
<td>25%</td>
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**Homework:** Each homework will be graded out of 50 points with questions given variable weights as described in each assignment. The lowest scoring homework for each student will be dropped and the remaining three scores will be used to compute the student’s final grade for the homework grade item. A successful student reads and begins homework assignments early, uses materials from class, the optional textbook, and outside resources to answer homework questions completely, and contacts the instructor during office hours to resolve ambiguities and questions.

**Quizzes:** Each quiz will be graded out of 20 points. Quizzes will be timed in-class assignments which will cover some aspect of that week’s objective. A successful student attends each class period and uses the optional textbook and outside resources to supplement lectures so that they are prepared to apply their learned skills in a timely fashion.

**Participation:** Students will be evaluated based on their attendance and participation in class discussions. A successful student attends each class period and uses class time to ask questions and initiate discussion with the instructor and their fellow students. Their attention and respect should be given to their fellow students and instructor during class time.

**Progress Report/Term Project:** Each student will be responsible for choosing and formally proposing a relevant problem associated with the course objectives and an interesting weekly objective, presenting their chosen problem to the class in a clear and concise way, researching and understanding that problem to a reasonable standard, presenting their understanding and a reasonable solution to that problem to the class in a clear and concise way, and writing a report which summarizes their work on their chosen problem. A successful student seeks out an interesting problem and engages with the instructor to ensure their problem is suitable for study. They work to understand their problem and potential existing solutions so that they can explain such to their fellow students to a reasonable standard and they convince themselves and their instructor of their expertise through a summary report in a timely fashion.

**Academic Integrity:** All University of Memphis students have agreed to abide by the University’s academic integrity policy summarized here. Plagiarism, cheating, and other forms of academic dishonesty are strictly prohibited. This includes, but is not limited to, the adoption or reproduction of ideas, words, statements, images, or works of another person as the student’s own without proper attribution, the use or attempted use of unauthorized materials, information, or aids in any academic exercise or test/examination, and the unauthorized falsification or invention of any information or
citation in an academic exercise. Students guilty of such academic misconduct, either directly or indirectly, through participation or assistance, will receive a failing grade on the assignment and, in some cases, may receive a failing grade in the course. This may be in addition to other possible disciplinary sanctions which may be imposed through the regular institutional disciplinary procedures.

If there is possible evidence that a student has committed an act of academic misconduct, the instructor will notify the student in writing of the evidence and allow the student five (5) business days to respond to the allegation. The student shall respond to the allegation by scheduling a meeting with the instructor to discuss the matter. After meeting with the student to review the alleged misconduct, the instructor shall either personally make a decision regarding appropriate action or they may refer the matter to the Academic Integrity Committee.