# **COMP 4200 Formal Languages**

# **Fall 2021 Course Syllabus**

*This syllabus is subject to change. Substantive changes will be announced in Canvas.*

*Updated: August 16, 2021*

# **Instructional Mode**

The instructional mode for this course is [*Campus*](https://www.auburn.edu/administration/registrar/documents/Summer_Fall_2021_Modalities.pdf). In brief, course will be conducted on campus in its entirety. The details of this are as follows.

* ***Lecture meetings*:** 2-2:50pm MWF at Broun-Koppel 2117
* ***Exams and Tests*:** Exams will be given during lecture times, and you are required to take each exam during this time. Midterm dates are decided by instructor. Final exam date follows the university calendar.
* ***Office Hours*:** Instructor walk-in office hours will be held via Zoom (<https://auburn.zoom.us/my/anhng8>) at 10-11:30am TR. To meet in-person, please email me ([anhnguyen@auburn.edu](mailto:anhnguyen@auburn.edu)) to arrange a specific meeting in advance.
* ***TA Office Hours:***Our TA is Ph.D. student Qi Li. His walk-in office hours will be held via Zoom (<https://auburn.zoom.us/j/81675945689>) at 4-5pm MWF. Please email him ([qzl0019@auburn.edu](mailto:qzl0019@auburn.edu)) to arrange a specific in-person meeting, if you want.

**Masks** are required at all times inside the classroom. You will be asked to leave without a mask.

You are expected to have all the equipment and software needed to be successful in this course. At a minimum, you must have a computer with a webcam and microphone, and a broadband Internet connection capable of installing and reliably running [Zoom](https://support.zoom.us/hc/en-us/articles/201362023-System-requirements-for-Windows-macOS-and-Linux). You must also be able to install and reliably run the software specific to this course as described later in this syllabus. If you have needs regarding instructional technology, you should contact the AU Bookstore at [books@auburn.edu](mailto:books@auburn.edu).

Times for all course events (assignment deadlines, exam times, etc.) will be set in US [Central Time](https://www.timeanddate.com/time/zones/ct). You are responsible for meeting deadlines in Central Time regardless of what your local time zone may be. You may find it helpful to follow the instructions linked [here](https://community.canvaslms.com/t5/Student-Guide/How-do-I-set-a-time-zone-in-my-user-account-as-a-student/ta-p/414) to have Canvas show deadlines appropriately in your local time zone to avoid any confusion.

# **Course Description**

COMP 4200 objectives are:

1. Understand mathematical and formal methods of computer science
2. Understand classes of abstract languages, their boundaries, and their representations both in terms of grammar and machine models
3. Understand the significance of formal languages for computer science in general

**Credit Hours:** 3 (LEC. 3)

**Prerequisite:** Undergraduate level COMP 3240 Minimum Grade of D

**Textbooks**

Michael Sipser, Introduction to the Theory of Computation, 3rd edition, Cengage Learning, 2013.

**Grades**

Your grade will be computed as follows:

1. Midterm exams: 02 exams, worth 20% each (40% total) *Dates follow class progress*.

2. Homework: 8 assignments in total (30% total)

3. Final exam: 30% *Date follows university.*

4. In-class participation: 5% (extra, optional)

**Attendance**

Class attendance is not required. However, in-class participation is encouraged and incentivized by an extra 5% of the total course grade.

**Late assignment submissions**

Everyone has **one chance to submit one assignment late** within 3 days of the due date without penalty. Any other late submissions will not be graded at all (unless permissions have been granted in advance for your case or formal excuses, e.g. medical documents, are provided).

**Grading scheme**

**Table

Description automatically generated**

**Tentative Schedule**

**Week 1:** Introduction, proofs, strings and sets, **hw 1**

**Week 2:** Finite automata and regular sets, **hw 2**

**Week 3:** Nondeterministic finite automata and conversion to DFA, **hw 3**

**Week 4:** Pattern matching, regular expressions & relation to finite automata, **hw 4**

**Week 5:** Limits of finite automata, Pumping lemma

**Week 6:** Review, **midterm 1**

**Week 7:**, Midterm 1 solution, Context-free grammars

**Week 8:** Context free grammars and languages, Chomsky Normal Form, **hw5**

**Week 9:** Pushdown automata, Parsing, **hw 6**

**Week 10:** Pushdown automata and relation to context-free grammars

**Week 11:** Turing machines and effective computability, **midterm 2**

**Week 12:** Universal machines and decidability, **hw 7**

**Week 13:** Diagonalization

**Week 14:** Implementing a Turing machine simulator, **hw 8**

**Week 15:** Catch-up, review

**Final Exam:** See university calendar for the date.

**Academic Integrity**

All tests, homework assignments, and especially programming assignments are expected to be exclusively the work of the one student submitting the assignment. Now, let me say that again, in different language. Do not give anyone a line of your code. Do not copy a single line of code from any other student, or any web site, or any previous student. If you do, it is cheating. You could fail the course or suffer other penalties. If you have any doubt about whether what you are doing is ethical, ask me -- I won't penalize anyone for asking, or for following my advice. Be aware I sometimes use a program that compares all student programs for algorithmic (not textual) similarity.

**Special Accommodations**

Students who need special accommodations should make an appointment to discuss your needs during office hours as soon as possible. If you do not have an Accommodation Memo, but need special accommodations, contact the appropriate university office.