

CSCI 4325, CRN 01-66646

Automata, Formal Languages, and Computability

Instructor	Dr. Tim Wylie
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Office Hours	M-F 1:00 p.m. - 2:00 p.m.
Schedule	Lecture: M-F, 9:45 a.m. - 11:15 a.m., EMAGC 1.202
Final Exam	July 15 th (T), 10:00 a.m. - 11:45 a.m., EMAGC 1.202
Textbook (required)	Introduction to the Theory of Computation (3 rd edition). Sipser, M., 2012. ISBN-13: 978-1133187790
(free)	Introduction to Theory of Computation. Maheshwari, A. and Smid, M., 2016. URL: cglab.ca/~michiel/TheoryOfComputation/
Course Website	academic.timwylie.com/25CSCI4325SUM/

CSCI 4325: Automata, Formal Languages, and Computability. The course presents formal computation models. Topics include finite state machine, pushdown state machine, Turing machine, halting problem, definition and properties of formal grammars and their languages as well as theory of computability and complexity including the complexity of optimization and approximation problems. Prerequisite: CSCI 3333 and CSCI 3336.

Course Overview

Modality. This is a Traditional Face-to-Face Course (TR). The modality is subject to change based on recommendations and guidelines.

Organization. Parts of the course will be online. Class participation will require the following online services and places that must be checked frequently.

- University email (utrgv.edu/mail)
- Course website
- Discord with the 4325 Discord channel

Each service serves a different purpose. The course website gives an overview of topics and major due dates, files, assignments, etc. The Discord server is an open forum for everyone to talk and connect. This is for discussing homework, corrections, clarifications, and for getting in touch with me. Zoom/Discord may be used for office hours and if we need to have some lectures online.

Recording. The use of classroom recordings is governed by the Federal Educational Rights and Privacy Act (FERPA), UTRGV's acceptable-use policy, and UTRGV HOP Policy STU 02-100 Student Conduct and Discipline. A recording of class sessions will be kept and stored by UTRGV, in accordance with FERPA and UTRGV policies. Your instructor will not share the recordings of your class activities outside of course participants, which include your fellow students, teaching assistants, or graduate assistants, and any guest faculty or community-based learning partners with whom we may engage during a class session. You may not share recordings outside of this course. Doing so may result in disciplinary action under UTRGV HOP Policy STU 02-100 Student Conduct and Discipline.

Grading. Attendance is required and part of the grade. If you miss class, there is no way to make it up. There will be daily/weekly quizzes during this course. There is no make-up quiz if you miss one. Students are expected to have assignments completed when specified. This may include selected readings from the textbook. The material in this course is naturally cumulative, with each week's topics building on all the

prior material. Therefore, each exam will focus on the material covered since the previous exam, however, the student is expected to understand and apply all previous course material.

<u>Grade Breakdown</u>		<u>Final Grade</u>	
Quizzes	30%	90%-100%	A
Assignments	10%	80%-89%	B
Exams/Projects	60%	70%-79%	C
		60%-69%	D
Total possible score (max):	100%	0%-59%	F

Note: Grades may be adjusted to reflect the overall performance of the class.

Course Schedule. This is a rough course schedule to give you an idea of topics and pacing. The actual course schedule is likely to change and will be kept up to date on the course website.

Weeks 1-2: Intro, discrete, Automata, Regular Languages, Context-Free, Non-regular Languages

Weeks 3-4: Turing Machines, Decidability, Computability Theory, Undecidable Languages

Weeks 4-5: Complexity Theory, Algorithms, Complexity Classes, Reductions, Topics of interest

Late Work Policy. In-class exercises and quizzes will not be accepted late. Assignments must be turned in at the specified time on the given due date for full credit. Any assignment turned in late will receive 50% credit. Assignments turned in early will receive an additional 10%.

Make-up Policy. No make-up exams will be given except for university sanctioned excused absences. If you need to miss an exam, it is your responsibility to contact me before the exam, or as soon after the exam as possible. Missing an exam without an approved (by the university or me) excuse will result in a zero.

Learning Outcomes

Program/ABET Outcomes	Student Learning Outcomes	Assessment
(1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	<ul style="list-style-type: none"> What is computation? This question is related to various computation models and their similarities. How are language definition and computability intertwined? This question is about the equivalence of language definition and computational capability. 	<ul style="list-style-type: none"> Exams 1, 2, 3
(6) Apply computer science theory and software development fundamentals to produce computing-based solutions.	<ul style="list-style-type: none"> What can and cannot be computed? This question is about computability. What can and cannot be efficiently computed? This question is about computational complexity. 	<ul style="list-style-type: none"> Exams 1, 2, 3

UTRGV Course Policies

Attendance. Students are expected to attend all scheduled classes and may be dropped from the course for excessive absences. UTRGV's attendance policy excuses students from attending class if they are participating in officially sponsored university activities, such as athletics; have been provided such an accommodation by Student Accessibility Services (SAS); for observance of religious holy days; or for military service. Accommodations related to COVID-19 should also go through SAS. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations.

Class Drop Policy. According to UTRGV policy, students may drop any class without penalty earning a grade of DR until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the "3-peat rule" and the "6-drop" rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time. The census date is June 12th, which is the last day to drop the class without it appearing on your transcript, and the last date to drop is July 3rd.

Scholastic Integrity Policy. Members of the UTRGV community uphold the Vaquero Honor Code's shared values of honesty, integrity and mutual respect in our interactions and relationships. In this regard, academic integrity is fundamental in our actions, as any act of dishonesty conflicts as much with academic achievement as with the values of honesty and integrity. Violations of academic integrity include, but are not limited to: cheating, plagiarism (including self-plagiarism), and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts (Board of Regents Rules and Regulations, STU 02-100, and UTRGV Academic Integrity Guidelines). All violations of Academic Integrity will be reported to Student Rights and Responsibilities through Vaqueros Report It.

Course Evaluation. Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account (my.utrgv.edu); you will be contacted through email with further instructions. Students who complete their evaluations will have priority access to their grades. Online evaluations will be available on or about:

Spring Module 1 (7 Weeks)	February 19 – 25, 2025
Spring Regular Term 2024	April 16 – May 7, 2025
Spring Module 2 (7 Weeks)	April 16 – 22, 2025

Sexual Misconduct and Mandatory Reporting. In accordance with UT System regulations, your instructor is a "Responsible Employee" for reporting purposes under Title IX regulations and so must report to the Office of Institutional Equity & Diversity (OIED@utrgv.edu) any instance, occurring during a student's time in college, of sexual misconduct, which includes sexual assault, stalking, dating violence, domestic violence, and sexual harassment, about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at www.utrgv.edu/equity, including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect that is free from sexual misconduct, discrimination, and all forms of violence. If students, faculty, or staff would like confidential assistance, or have questions, they can contact OVAVP (Office for Victim Advocacy & Violence Prevention) at (956) 665-8287, (956) 882-8282, or OVAVP@utrgv.edu.

Students with Disabilities. Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive reasonable academic accommodations should contact **Student Accessibility Services (SAS)** for additional information. In order for accommodation requests to be considered for approval, the student must apply using the mySAS portal located at www.utrgv.edu/mySAS and is responsible for providing sufficient documentation of the disability to SAS. Students are required to participate in an interactive discussion, or an intake appointment, with SAS staff. Accommodations may be requested at any time but are not retroactive, meaning they are valid once approved by SAS. Please contact SAS early in the semester/module for guidance. Students who experience a broken bone, severe injury, or undergo surgery may also be eligible for temporary accommodations.

Pregnancy, Pregnancy-related, and Parenting Accommodations. Title IX of the Education Amendments of 1972 prohibits sex discrimination, which includes discrimination based on pregnancy, marital status, or parental status. Students seeking accommodations related to pregnancy, pregnancy-related condition, or parenting (reasonably immediate postpartum period) should submit the request using the form found at <https://www.utrgv.edu/pregnancyandparenting> for review by Student Accessibility Services.

Student Accessibility Services.

- **Brownsville Campus:** Student Union (BSTUN) 1.20. Phone: (956) 882-7374. Email: ability@utrgv.edu.
- **Edinburg Campus:** University Center (EUCTR). Phone: (956) 665-7005. Email: ability@utrgv.edu.

Student Services. We are committed to your personal, academic, and professional success; please know you can reach out to me for questions and/or I can help you identify the resources you need. UTRGV offers student support resources designed to contribute to your well-being and academic excellence.

Students seeking academic help in their studies can use university resources in addition to an instructor's office hours. University Resources include the Advising Center, Career Center, Counseling Center, Learning Center, and Writing Center. These centers provide services such as tutoring, writing help, counseling services, critical thinking, study skills, degree planning, and connections student employment (through Handshake

and HR Student Employment). In addition, services, such as the Food Pantry are also provided. Locations are listed below.

Center Name	Brownsville Campus	Edinburg Campus
Advising Center (AcademicAdvising@utrgv.edu)	BMAIN 1.400, (956) 665-7120	EITTB 1.000, (956) 665-7120
Career Center (CareerCenter@utrgv.edu)	BINAB 1.105, (956) 882-5627	ESTAC 2.101, (956) 665-2243
Counseling Center (Counseling@utrgv.edu)	BSTUN 2.10, (956) 882-3897	EUCTR 109, (956) 665-2574
Food Pantry (FoodPantry@utrgv.edu)	BCAVL 101 & 102, (956) 882-7126	EUCTR 114, (956) 665-3663
Learning Center (LearningCenter@utrgv.edu)	BMSLC 2.118, (956) 882-8208	ELCTR 100, (956) 665-2585
Writing Center (WC@utrgv.edu)	BLIBR 3.206, (956) 882-7065	ESTAC 3.119, (956) 665-2538

Dean of Students Resources. The Dean of Students office assists students when they experience a challenge with an administrative process, unexpected situation such as an illness, accident, or family situation, and aids in resolving complaints. Additionally, the office facilitates student academic related requests for religious accommodations, support students formerly in foster care, helps to advocate on behalf of students and inform them about their rights and responsibilities, and serves as a resource and support for faculty and campus departments.

Vaqueros Report It allows students, staff, and faculty a way to report concern about the well-being of a student, seek assistance in resolving a complaint, or report allegations of behaviors contrary to community standards or campus policies. The Dean of Students can be reached by email (dos@utrgv.edu), phone (956-665-2260), (956-882-5141), or by visiting one of the following office locations: Student Union (BSTUN) 1.20 or University Center (EUCTR 323). Phone: 956-665-2260.