

**Arab Academy for Science and Technology and Maritime Transport
Computer Science Curriculum
Course Syllabus**

Course Code: CS311	Course Title: Theory of Computation	Classification: R	Coordinator's Name: Prof. Dr. Khaled Mahar, Dr. Radwa Fathalla Lecturer's name: Dr. Radwa Fathalla	Credit Hours: 3
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Pre-requisites: CS202 (Discrete Structures)	Co-requisites: None	Schedule: Lecture: 2 hours Tutorial-Lab: 2 hours
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Office Hours: (Room 405)

Dr. Radwa Fathalla : Monday 12:30 a.m. -2:00 p.m.

Course Description:

This course introduces the fundamental mathematical models of computation. The course presents both inherent capabilities and limitations of these computational models as well as their relationships with formal languages. Topics to be covered include: Finite automata and regular languages, deterministic and nondeterministic computations, pumping lemma for regular languages, context-free grammars and languages, pushdown automata, pumping lemma for context-free languages, and Turing machines and their variants.

Textbook:

Michael Sipser, *Introduction to the Theory of Computation*, Cengage Learning.

References:

John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, *Introduction to Automata Theory, Languages, and Computation*, Addison-Wesley.

Course Objective/Course Learning Outcome:	Contribution to Program Student Outcomes:
<p>1. Understand the capabilities and limitation of computational models.</p>	<p>(SO 1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.</p>
<p>2. Prove whether or not a given language is regular.</p>	<p>(SO 6) Apply computer science theory and software development fundamentals to produce computing-based solutions.</p>
<p>3. Prove whether or not a given language is context-free.</p>	
<p>4. Design variants of Turing machines.</p>	
<p>5. Understand the relationship between the regular, context-free and recursively enumerable languages.</p>	
<p>6. Implement simple parsers using Finite State Automata and regular expressions.</p>	<p>(SO 1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.</p>

<p>Course Outline:</p> <ol style="list-style-type: none"> 1. Deterministic Finite State Automata 2. Non-Deterministic Finite State Automata 3. Equivalence between DFA and NFA 4. Regular Expressions 5. Non-Regular Languages 6. Context-Free Grammars 7. Context-Free Grammars 8. 7th week exam 	<ol style="list-style-type: none"> 9. Push-Down Automata 10. Non-Context Free Languages 11. Turing Machines 12. Variants of Turing Machines 13. 12th week exam 14. Complexity Theory 15. Revision 16. Final Exam
<p>Grade Distribution:</p> <p>7th Week Assessment (30%): Exam (25%) + Section quiz 5%</p> <p>12th Week Assessment (20%): Exam (15%) + Section quiz 5%</p> <p>Year Work (10%): Homework Assignments (10%)</p> <p>Final Exam (40%)</p>	
<p>Policies:</p> <p>Attendance: AASTMT Education and Study Regulations (available at aast.edu)</p> <p>Academic Honesty: AASTMT Education and Study Regulations (available at aast.edu)</p> <p>Late Submission: <i>Late submissions are graded out of 75% (1 week late), 50% (2 weeks late), 25% (3 weeks late), 0% (more than 3 weeks late)</i></p>	