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:** Dr. Nahla Belal **Lecturer's name:**	**Credit Hours:** 3
Pre-requisites: CS202 (Discrete Structures)	**Co-requisites:** None	**Schedule:** Lecture: 2 hours Tutorial-Lab: 2 hours		

Office Hours: (Room 405)
Thursday 10:30 a.m. -12:30 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:
1. Understand the capabilities and limitation of computational models.	(SO 1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Prove whether or not a given language is regular.	(SO 6) Apply computer science theory and software development fundamentals to produce computing-based solutions.
3. Prove whether or not a given language is context-free.	
4. Design variants of Turing machines.	
5. Understand the relationship between the regular, context-free and recursively enumerable languages.	
6. Implement simple parsers using Finite State Automata and regular expressions.	(SO 1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

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<td>Course Outline:

Week 1. Introduction, Deterministic Finite State Automata
Week 2. Non-Deterministic Finite State Automata, Equivalence between DFA and NFA
Week 3. Regular Expressions
Week 4. Non-Regular Languages
Week 5. Context-Free Grammars
Week 6. Context-Free Grammars (cont.)
Week 7. 7th Week Assessment</td>
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Week 8. Push-Down Automata
Week 9. Non-Context Free Languages
Week 10. Turing Machines
Week 11. Variants of Turing Machines
Week 12. 12th Week Assessment
Week 13. Complexity Theory
Week 14. Complexity Theory (cont.)
Week 15. Revision
Week 16. Final Exam</td>
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<td colspan="2">Grade Distribution:

7th Week Assessment (30%)

12th Week Assessment (20%)

Year Work (10%)

Final Exam (40%)</td>
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<td colspan="2">Policies:

Attendance:
AASTMT Education and Study Regulations (available at aast.edu)

Academic Honesty:
AASTMT Education and Study Regulations (available at aast.edu)

Late Submission:
Late submissions are graded out of 75% (1 week late), 50% (2 weeks late), 25% (3 weeks late), 0% (more than 3 weeks late)</td>
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