



The University of Jordan
Accreditation & Quality Assurance Center

COURSE Syllabus

Course Syllabus

1	Course title	Theory of Computation and Complexity
2	Course number	1901717
3	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4	Prerequisites/corequisites	N/A
5	Program title	Computer Science
6	Program code	01
7	Awarding institution	The University of Jordan
8	Faculty	King Abdullah II School for Information Technology
9	Department	Computer Science Department
10	Level of course	Graduate course
11	Year of study and semester (s)	Second Semester
12	Final Qualification	Master degree
13	Other department (s) involved in teaching the course	N/A
14	Language of Instruction	English
15	Date of production/revision	January 29, 2018
16	Required/ Elective	Elective (thesis track), Required (non thesis track)

16. Course Coordinator:

Dr. Khair Eddin Sabri

Office numbers: KASIT 117

Office hours:

Monday: 11:00 – 12:30

Tuesday: 1:00 – 3:00

Wednesday: 12:30-2:00

Phone number: 22557

Email addresses: k.sabri@ju.edu.jo

17. Other instructors:

N/A

18. Course Description:

Finite Automata and Regular Languages, Properties of Finite Automata, Regular Expressions, The Pumping Lemma and Closure Properties; Universal Models of Computation, Encoding Instances, Choosing a Model of Computation, Model Independence, Turing Machines as Enumerators and Acceptors; Computability Theory, Primitive Recursive Functions, Partial Recursive Functions, Arithmetization: Encoding a Turing Machine, Programming Systems,

Recursive and R.E. Sets, Rice's Theorem and the Recursion Theorem, Degrees of Unsolvability; Complexity Theory, Reductions, Classes of Complexity, Complete Problems; Some Important NP-Complete Problems, The Complexity of Approximation, Models of Parallel Computation, Communication and Complexity, Interactive Proofs and Probabilistic Proof Checking

19. Course aims and outcomes:

A- Aims:

The main objective of this course is to provide an understanding of the concepts of computability and computational complexity.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to ...

- A1) Understand the use of automata, grammars and regular languages to represent languages*
- A2) Understand the relationship between regular languages, context free languages, decidable languages and recognizable languages.*
- A3) Understand the limitation of computers*
- A4) Understand the main complexity classes and their relationship.*

B- Intellectual skills: with the ability to ...

- B1) Compare and analyze different types of automata and grammars*
- B2) Evaluate problems in computability and complexity*

C- Subject specific skills – with ability to ...

- C1) Construct Finite Automata, Nondeterministic Automata, and Turing Machines to describe languages*
- C2) Proving the decidability of languages*
- C3) specify the complexity classes of languages*

D- Transferable skills – with ability to

- D1) Relate problems in real world to formal languages, automata, computability and complexity*
- D2) Choose appropriate mathematical model for a various problems in computer science.*
- D3) Analyze a research paper related to the theory of computation.*

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
Introduction	1	Dr. Khair Eddin Sabri		Quiz, Midterm, Final	Chapter 0
Finite automata, Regular expression, Regular language	2,3	Dr. Khair Eddin Sabri	A1, C1	Quiz, Project, Midterm, Final	Chapter 1
Context-Free Languages	3,4	Dr. Khair Eddin Sabri	A1, B1, C1, D1	Quiz, Midterm, Final	Chapter 2
Turing Machine	5	Dr. Khair Eddin Sabri	A1, A2, B1, C1, D1	Quiz, Project, Midterm, Final	Chapter 3
Decidability	6	Dr. Khair Eddin Sabri	A1, A2, A3, B2, C2	Midterm, Final	Chapter 4
Reducibility	7	Dr. Khair Eddin Sabri	A3, B2, C2	Midterm, Final	Chapter 5
Midterm	8	Dr. Khair Eddin Sabri		Project, Midterm, Final	
Time Complexity	9	Dr. Khair Eddin Sabri	A4, B2, C3, D1	Project and Final	Chapter 7
Space Complexity	10	Dr. Khair Eddin Sabri	A4, B2, C3, D1	Final	Chapter 8
Intractability	11	Dr. Khair Eddin Sabri	A4		Chapter 9
Student Presentations	12, 13, 14	Dr. Khair Eddin Sabri	D1, D2, D3	Final	Presentation
Final	15	Dr. Khair Eddin Sabri			

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

Teaching (T) Strategies: The Course will be delivered using different means like lecture, discussion and presentation of applications.

Learning (L) Methods: Students attend classes, ask questions and participate in discussions, do the home works, solve suggested questions. Students will access the e-learning platform for more instruction and supported learning materials.

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

There will be several assessment methods of evaluation the performance of the students such as attending and class participation; analyzing and presenting a research paper; conducting the Midterm and the Final Exams.

23. Course Policies:

A- Attendance policies:

Deliberate abstention from attending 1901717 classes and any other similar acts will lead to student deprivation from the course according to the UJ regulations

B- Absences from exams and handing in assignments on time:

If you miss the midterm, then a makeup exam will not be provided unless you submit a valid absence excuse, within three days from the midterm, to your lecturer. This excuse must be signed and stamped from the UJ hospital in order to be valid. If your lecturer accepts the excuse then you will be able to take the midterm makeup. You need to follow up the departmental announcements regarding the makeup date and time. Please note that the lecturer may either accept or reject your excuse based on UJ regulations

C- Health and safety procedures:

N/A

D- Honesty policy regarding cheating, plagiarism, misbehavior:

All students in this course must read the University policies on plagiarism and academic honesty

E- Grading policy:

- Midterm Exam: 30%
- Problem solving: 10%
- Research paper analysis and presentation 20%
- Final Exam: 40%

F- Available university services that support achievement in the course:

N/A

24. Required equipment:

25. References:

A- Required book (s), assigned reading and audio-visuals:

- *Introduction to the theory of computation, Michael Sipser, Thomson, 3rd edition,*

B- Recommended books, materials, and media:

- *An Introduction to Formal Languages and Automata, Peter Linz, Heath company, ISBN 0-7637-1422-4.*
- *Elements of the theory of computation, H.R Lewis and C.H Papadimitriou, Prentice Hall, 2nd Edition.*

26. Additional information:

Name of Course Coordinator: -----Signature: ----- Date: -----

Head of curriculum committee/Department: ----- Signature: -----

Head of Department: ----- Signature: -----

Head of curriculum committee/Faculty: ----- Signature: -----

Dean: ----- -Signature: -----

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File