QFO-AP-FI-MO02	Course Syllabus :اسم النموذج	جامعة فيلادلفيا Philadelphia University
رقم الاصدار : 1 (Revision)	الجهة المصدرة: كلية تكنولوجيا المعلومات	
التاريخ :2017/11/05	الجهة المدققة: عمادة التطوير والجودة	
عدد صفحات النموذج:		

Course Title: Theory of Computation	**Course code: 750224**
Course Level: 2	**Course prerequisite(s) and/or corequisite(s): 250104**
Lecture Time:	**Credit hours: 3**

Academic Staff Specifics

Name	Rank	Office Number and Location	Office Hours	E-mail Address

Course Description:
This course covers the fundamental computational models (Finite automata, Pushdown automata, Turing machines) and formal languages (Regular, Non Regular, Context free languages) used throughput the computer science discipline.

Course Objectives:
This course aims to provide students with an understanding of basic concepts in the theory of computation and to introduce students to the mathematical foundations of computation and languages.

Course Components
Mathematical Preliminaries
Regular Languages, Non Regular Languages, Finite Automata
Context Free Languages, PushDown Automata
Turing Machines

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

Teaching Methods:
Duration: 16 weeks, 48 hours in total

Lectures: 38 hours (2-3 per week),
Tutorials: 8 hours (on average, 1 per 2 weeks)
Home works: 3 Assignments

Learning Outcomes:

A. Knowledge and understanding

A1- Acquire a full understanding and mentality of Automata Theory such as RE's, DFA's, NFA's, Stack's, Turing machines, and Grammars as the basis of all computer science languages design

B. Intellectual skills (thinking and analysis)

B1- Be able to analysis and design FAs, NFAs, Grammars, languages modelling, small compilers basics

B2- Be able to design and implement software for sample automata.

B3- Identify a range of automata solutions and critically evaluate and justify proposed design solutions.

B4- Practice self-learning by using the e-library and e-course.

C. **Practical skills**

C5- Working on assignment and show a personal responsibility to complete the work.

C6- Employ discrete and continuous mathematical skills on the practical projects.

D. Transferable skills.

D2- Prepare coherent desing using minimization of FA's and Grammars of Context Free Languages and written technical reports.

D3- Give technical presentations for automata design.

Learning outcomes achievement:

- **Assessment**: A1, B2 are assessed by quizzes and examinations; B3, D2, D3, D5 and C6 are assessed by assignments and lab work.
- **Development:** A1, B1, B3, and D2, are developed through the lectures.
  B1, B2, and D2, are developed trough Tutorials and Lab sessions,
  B4, D3, and C5 are developed through Homework and assignments.

Assessment Instruments

Allocation of Marks	
Assessment Instruments	**Mark**
First examination	**20%**
Second examination	**20%**
Final Exam (written unseen exam)	**40%**
Reports, research projects, Quizzes, Home works, Projects	**20%**
Total	**100%**

** Make-up exams will be offered for valid reasons only with consent of the Dean. Make-up exams may be different from regular exams in content and format.*

Practical Submissions

The assignments that have work to be assessed will be given to the students in separate documents including the due date and appropriate reading material.

Documentation and academic honesty

Submit your home work covered with a sheet containing your name, number, course title and number, and type and number of the home work (e.g. tutorial, assignment, and project).

Any completed homework must be handed in to my office (room ---) by 15:00 on the due date. After the deadline "zero" will be awarded. You must keep a duplicate copy of your work because it may be needed while the original is being marked.

You should hand in with your assignments:

1- A printed listing of your test programs (if any).
2- A brief report to explain your findings.
3- Your solution of questions.

- **Protection by Copyright**

1. Coursework, laboratory exercises, reports, and essays submitted for assessment must be your own work, unless in the case of group projects a joint effort is expected and is indicated as such.
2. Use of quotations or data from the work of others is entirely acceptable, and is often very valuable provided that the source of the quotation or data is given. Failure to provide a source or put quotation marks around material that is taken from elsewhere gives the appearance that the comments are ostensibly your own. When quoting word-for-word from the work of another person quotation marks or indenting (setting the quotation in from the margin) must be used and the source of the quoted material must be acknowledged.
3. Sources of quotations used should be listed in full in a bibliography at the end of your piece of work.

- **Avoiding plagiarism**.

1. Unacknowledged direct copying from the work of another person, or the close paraphrasing of somebody else's work, is called plagiarism and is a serious offence, equated with cheating in examinations. This applies to copying both from other students' work and from published sources such as books, reports or journal articles.
2. Paraphrasing, when the original statement is still identifiable and has no acknowledgement, is plagiarism. A close paraphrase of another person's work must have an acknowledgement to the source. It is not acceptable for you to put together unacknowledged passages from the same or from different sources linking these together with a few words or sentences of your own and changing a few words from the original text: this is regarded as over-dependence on other sources, which is a form of plagiarism.
3. Direct quotations from an earlier piece of your own work, if not attributed, suggest that your work is original, when in fact it is not. The direct copying of one's own writings qualifies as plagiarism if the fact that the work has been or is to be presented elsewhere is not acknowledged.
4. Plagiarism is a serious offence and will always result in imposition of a penalty. In deciding upon the penalty the Department will take into account factors such as the year of study, the extent and proportion of the work that has been plagiarized, and the apparent intent of the student. The penalties that can be imposed range from a minimum of a zero mark for the work (without allowing resubmission) through caution to disciplinary measures (such as suspension or expulsion).

Course/Module Academic Calendar

Week	Basic and support material to be covered	Homework/reports and their due

		dates
1, 2	**Mathematical Preliminaries** Sets Sequences and tuples Functions and relations Strings and languages . Boolean logic Types of Proof: Proof by construction, Proof by contradiction Proof by induction .	Tutorial 1
3, 4, 5, 6, 7	**Finite Automata, Regular Languages, Non Regular Languages** Central concepts of Automata Theory. Regular Expressions; Operations on Regular expressions Finite Automata and Regular Expressions. Conversion from FA and regular expressions. Deterministic Finite Automata (DFA); Minimization of DFA. Non-Deterministic Finite Automata (NDFA). Equivalence of Deterministic and Non-Deterministic Finite Automata. Equivalence between DFA,NFA, NFA-Λ Non Regular languages	Quiz 1 Tutorial 2 Tutorial 3 Quiz 2 Assignment 1 Tutorial 4
8, 9, 10, 11, 12	**First Exam** **Pushdown Automata, Context Free Languages** Parse Trees; Ambiguity in Grammars and Languages. Standard Forms; Chomsky Normal Forms; Minimization of CFG's. Pushdown Automata (PDA). Deterministic and Non-Deterministic (PDA); Formal definition of NPDA. Transition functions of NPDA; NPDA Execution. Accepting Strings with NPDA; Equivalence of PDAs and CFG.	Tutorial 5 Quiz 3 Tutorial 6 Assignment 2
13, 14, 15	**Turing Machine** Multi-tapes TM TM-Acceptor TM-Translator TM-Function evaluator Programming Techniques for Turing Machines; Formal definition of TM's	Quiz 4 Tutorial 7 Tutorial 8 Assignment 3
16	**Revision -- Final Exam**	

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:
Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Module References
Students will be expected to give the same attention to these references as given to the Module

Introduction to Languages and the Theory of Computation, Fourth Edition
John C. Martin
McGraw-Hill © 2011

Simulators:
In order to improve the pedagogy of this course, interactive animations of the various automata using available simulators are recommended.

Web
http://www.gobookee.org/theory-of-computation/