LANGUAGES & DATA STRUCTURES in Fall 2018 (CS2071)

Course Code	CS2071	**Professor(s)**	Georgi Stojanov
Prerequisites	None	**Office Number**	SD1 office 7
Class Schedule	TF: 13:45-15:05 in PL-4	**Office Hours**	by appointment, after cass
Credits	4	**Email**	gstojanov@aup.edu
Semester	Fall 2018	**Office Tel. Ext.**	NA

Course Description

After the Introduction to programming courses (pre-requisites for this course) the objective of this course is to introduce several deeper theoretical concepts from Computer Science.

The course opens with a brief overview of the history of computing.

Then, the students will be presented with different ways of formalizing the notion of computing: from final automata to Turing machines.

Tools for estimating spatial and temporal complexity of algorithms will be presented.

The notion of Abstract Data Type (ADT) and its role in algorithm design will be explained.

Most important classes of ADTs and the properties of commonly used algorithms will be studied.

Finally, as case studies, we will explore the best practices of algorithms used for graph traversals and search as well as sorting algorithms.

Course Learning Outcomes

have deep understanding of abstract computing machines
have solid knowledge in algorithm design and analysis
be able to use algorithm complexity analysis tools
be able to recognize algorithm design patterns as well as most important ADTs
be familiar with several classes of most widely used algorithms for tree traversals, sorting, and operations on graphs.

General Education

This course cannot be used to fulfill the any general education requirement at AUP.

Course Outline

Below is a weekly break down of topics that will be covered in the course. This is a tentative schedule of what is covered in each week.

Week 1: History of Computation; Intro to Final State Machines (FSM)

Week 2: Kleene’s Theorem and Regular Expressions (RE); FSM to RE conversion;

Week 3: Formal Grammars; Types of grammars; Summary of Context Free Grammars;

Week 4: Turing Machines and universal computing;

Week 5: Writing algorithms in pseudo—code; Algorithm analysis;

Week 6: Algorithm Complexity and Big-O notation; Asymptotic behavior analysis;

Week 7: Recursion; Analysis of recursive algorithms;

Week 8: Introduction to Abstract Data Types (ADTs); Stacks, Queues, Double queues;

Week 9: Implementations of ADTs;

Week 10: Trees; Tree traversals;

Week 11: General vs Binary trees; Trees implementations;

Week 12: Binary search trees; priority queues, Sorting, Heaps;

Week 13: Maps, Hash Tables;

Week 14: Graphs;

Textbooks

This course doesn't have any textbook.

Attendance Policy

Students studying at The American University of Paris are expected to attend ALL scheduled classes, and in case of absence, should contact their professors to explain the situation. It is the student’s responsibility to be aware of any specific attendance policy that a faculty member might have set in the course syllabus. The French Department, for example, has its own attendance policy, and students are responsible for compliance. Academic Affairs will excuse an absence for students’ participation in study trips related to their courses.

Attendance at all exams is mandatory.

IN ALL CASES OF MISSED COURSE MEETINGS, THE RESPONSIBILITY FOR COMMUNICATION WITH THE PROFESSOR, AND FOR ARRANGING TO MAKE UP MISSED WORK, RESTS SOLELY WITH THE STUDENT.

Whether an absence is excused or not is ALWAYS up to the discretion of the professor or the department. Unexcused absences can result in a low or failing participation grade. In the case of excessive absences, it is up to the professor or the department to decide if the student will receive an “F” for the course. An instructor may recommend that a student withdraw, if absences have made it impossible to continue in the course at a satisfactory level.

Students must be mindful of this policy when making their travel arrangements, and especially during the Drop/Add and Exam Periods.

Grading Policy

Assessment Components

Homework assignments: (30%)

Laboratory work and presentations (20%)

Mid-term examination (20%)

Final examination: (30%)

Grade Scales:

[A+, A, A-] = [95, 93, 90] %

[B+, B, B-] = [86, 82, 78] %

[C+, C, C-] = [72, 63-71, 57-62] %

[D+, D, D-] = [56, 52, 48] %

[F] = [47 or below] %

Other

Useful tips:

- Be proactive.
- Read the assigned texts.
- Do your homework at home.
- Ask for help via email: reply guaranteed within hours and never beyond 24 hrs.
- Work in group is encouraged but you always submit individually.