

**Department:** Computer Science and Mathematics

<b>Course Code &amp; Name</b>	<b>CSC310 Algorithms and data Structures</b>
<b>Class Time and Location</b>	TR: 9:30am – 10:45am; TR: 12:30pm – 1:45pm;
<b>INSTRUCTOR</b>	Faisal N. Abu-Khzam
<b>Credits Hours</b>	3
<b>Semester</b>	Fall 2020

#### INSTRUCTOR

**Email:** faisal.abukhzam@lau.edu.lb

**web page:** <http://www.csm.lau.edu.lb/fabukhzam>

**Office:** OG411

**Office Hours:** MWF 12:00-13:00 and 14:00-15:00 (or by appointment)

#### CURRENT CATALOG DESCRIPTION

CSC310 presents fundamental computing algorithms and data structures, with emphasis on design and analysis. Topics include: asymptotic analysis of upper and average complexity bounds; best, average, and worst case behaviors; big-O, little-o,  $\Omega$ , and  $\Theta$  notation; recurrence relations; sets; hashing and hash tables; trees and binary trees: properties, tree traversal algorithms; heaps; priority queues; graphs: representation, depth- and breadth-first traversals and applications, shortest-path algorithms, transitive closure, topological sort; sorting algorithms and performance analysis: mergesort, quicksort, heapsort; fundamental algorithmic strategies: divide-and-conquer approach, greedy, recursive backtracking.

#### PRE- OR CO-REQUISITE

CSC 245 Objects and Data Abstraction and MTH 207 Discrete Structures I

#### COURSE TYPE

Required  Major's Elective  General Elective

#### COURSE LEARNING OUTCOMES

At the completion of this course, the student will able to:

- CLO1. Explain, implement, and apply the following data-structures: binary search trees, heaps, graphs, and hash tables.
- CLO2. Analyze search and sorting algorithms, and explain their relationship to data structures.
- CLO4. Solve problems using different algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking, and branch and bound.
- CLO5. Analyze the time and space complexity of Algorithms using tight asymptotic bounds and asymptotic upper bounds.

#### STUDENT OUTCOMES ADDRESSED IN THIS COURSE

Course Outcome 1 contributes to SO.1, SO.6

Course Outcome 2 contributes to SO.2

Course Outcome 3 contributes to SO.6

Course Outcome 4 contributes to SO2 and SO.6

#### TEXTBOOK

Cormen et al. Introduction to Algorithms, 3<sup>rd</sup> Ed., MIT Press, 2010.



## TOPICS COVERED IN THE COURSE

<i>Week</i>	<b>Lecture / activity</b>
1-2	Mathematical foundations for algorithmic analysis
2-3	Sorting (and Order Statistics, if time permits)
4-5	Elementary data structures: Trees and trees properties; heaps & priority queues; Hash tables...
6	Graphs and graph traversal
7	Graphs algorithms
8	NP-Complete problems
9	Recursive backtracking
10-11	Dynamic Programming and Greedy Algorithms
12-13	Advanced data structures, including disjoint sets (and binomial heaps, if time permits)

## TEACHING/LEARNING METHOD

- Lectures
- HW
- *Students will be asked to write lecture summaries or short quizzes at the end of some lectures*
- Labs and lab quizzes
- Exams

## COURSE GRADING AND PERFORMANCE CRITERIA

Labs/Quizzes:	30%
Midterm:	30%
Final:	40%

## STUDENT CODE OF CONDUCT - ACADEMIC VIOLATIONS

The following table defines the sanction(s) associated with each violation. In some cases and when the violation is too general, a range of sanctions is set for the pertinent committee to choose from depending on the specifics of each case. As for the second offense, the set sanctions apply regardless whether the violation has taken place in the same course or a different one, within the same semester or not.

<b>Code #</b>	<b>Violation</b>	<b>First Offense</b>	<b>Second Offense</b>
<b>Cheating</b>			
2.2.1	Using material or equipment (including mobile phones, electronic tablets, i-pads, calculators, and other devices) that is not authorized by the instructor in an examination, project, or graded assignment	zero on the deliverable with a warning	F on the course with a warning
2.2.2	Cheating, copying, collaborating with or aiding another Student in a manner not permitted by the instructor on an examination, project, or other graded assignment	zero on the deliverable with a warning	suspension
2.2.3	Distributing or aiding in the distribution of previous exams without authorization of the instructor	double warning – suspension	suspension – expulsion
2.2.4	Stealing, reproducing, or circulating an examination or other graded assignment before it has been administered	suspension	expulsion
2.2.5	Impersonating another Student or allowing another Student to impersonate one's self during an examination, presentation, or other graded assignment	suspension for both	expulsion
2.2.6	Impersonating an assistant, staff member, or faculty member for the purpose of (a) proctoring examinations without authorization or permission or (b) obtaining	suspension – expulsion	expulsion



Code #	Violation	First Offense	Second Offense
	confidential information regarding coursework or examinations		
2.2.7	Receiving, purchasing or selling a project, paper, or any academic document and presenting it as work other than that of the author	suspension – expulsion	expulsion
2.2.8	Submitting identical papers or coursework for credit in more than one class without the permission of the instructor	zero on the deliverable with a warning	F on the course with a warning
<b>Plagiarism and Copyright Violations</b>			
2.2.9	Failing to attribute language or ideas to their original source by not crediting the original author with an appropriate acknowledgement or citation	zero on the deliverable with a warning	F on the course with a warning
2.2.10	Using photocopied or electronic copies of textbooks, compact disks, films, music, online course materials, and other content beyond the fair use policy within University Premises	warning	double warning
2.2.11	Using copyrighted materials, including in written research reports and papers, without obtaining required permission, if any, from the rights holder	warning	double warning
<b>Unauthorized Sale, Distribution, or Use of Course Materials</b>			
2.2.12	Recording any lecture or presentation for personal use or public distribution without the prior consent of the course instructor. This applies to the unauthorized use of any medium including but not limited to mobile phones, electronic tablets, i-pads recorders, films, and other devices	warning	double warning
2.2.13	Selling academic materials by any Student, club, or group. This includes but is not limited to lectures, course recordings, class notes, and previous exams	warning	double warning

#### UNIVERSITY ATTENDANCE POLICY

1. Students are expected to attend all classes.
2. For valid reasons, students may miss classes for a maximum that is equivalent to two regular weeks.
3. When exceeding the maximum number of absences, it is the instructor’s prerogative to ask the concerned student to stop attending and drop the course. In this case, it is the student’s responsibility to drop the course, otherwise a grade of “F” or “NP” will be given.
4. In exceptional justified cases (long illness, etc...), where absences exceed the maximum, the student has to petition to the department Chair to be allowed to stay in the course.
5. Students are held responsible for all the material presented in the classroom, even during their absence.

#### WITHDRAWAL POLICY

WI is equivalent to Early Withdrawal

WP is equivalent to Withdrawal/Pass

WF is equivalent to Withdrawal/Fail

1. A student who withdraws after the Drop/Add period and by the end of the 5th week of classes (10th day of classes for Summer Modules) will obtain a “WI” on that particular course.

The student may process such request directly through the Registrar’s Office.

2. A student who withdraws from a course between the 6th week and the end of the 10th week of classes (18th day of classes for Summer Modules) will receive either a “WP” or a “WF”. “WP” or “WF” will be determined by the instructor based on the achieved academic performance in that course till the time of withdrawal.

3. The “WI” and the “WP” will not count as a Repeat; whereas the “WF” will count as a Repeat.



4. “WI”, “WP” and “WF” will not count towards the GPA calculation.

**Deadline for the “WP” and “WF” withdrawal from courses:** check university calendar (It is the student’s responsibility to drop the course)

#### **COURSE ONLINE EVALUATIONS**

**In order to improve the effectiveness of the educational process, all students are expected to submit their course evaluations by the last day of classes.**

**Students who fail to complete the evaluation of ALL registered courses by the set deadline:**

- 1. will not be able to access their course grades from Banner or Portal until two weeks after the end of the final exams period; and**
- 2. will not be able to request transcripts.**

**The anonymity of the process and the students will be maintained at all times.**

#### **TIPS FOR SUCCESS**

- Study daily and come to class prepared.
- Make sure you solve all the lab problems during or after each lab.
- Consistent attentive attendance is key to success in this course.

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#### **RELATIONSHIP BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES**

- Students shall be able to apply their computational and mathematical knowledge in order to solve computational problems.
- Students shall develop the ability to analyze a problem, identify, define, and verify the computing requirements appropriate to its solution.
- Students shall learn to work effectively and interactively in teams in order to accomplish a common goal.
- Students shall develop the ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.