ITS350 - Algorithms and Data Structure

AUIS - Department of Information Technology

1 Course Information

Course ID	ITS350,
Course Title	Algorithms and Data Structure,
Course Level	Undergraduate,
Course Design	Required for all SE major students Elective for the rest,
Number of Credits	3,
Prerequisites	ITE303,
Class Location	<TBD>,
Meeting Time	Mondays from 12:30 to 14:00 (Section 1), Mondays from 14:15 to 15:45 (Section 2), Wednesdays from 12:30 to 14:00 (Section 1), Wednesdays from 14:15 to 15:45 (Section 2).

2 Instructor Information

Instructor	Yad Tahir, PhD,
Email Address	yad.tahir@auis.edu.krd,
Office Hours	Sundays from 11:00 to 14:00,
Office Location	B-F2-15.

3 Course Description

This course introduces fundamentals of data structures and algorithms. Main topics include data structures such as lists, stacks, queues, arrays, trees, and other advanced data structures used in high level programming languages. Students will also engage in study of algorithmic techniques for hashing, sorting and searching, and the preliminary analysis of such algorithms to determine their complexity and efficiency. The students will implement the basic data structures to solve programming problems.

4 Learning Outcomes

Upon successful completion of the course, students will be able to:

- Define and implement data structures, algorithms and programming techniques; including lists, stack, queues, trees, hash tables, sorting and search algorithms.
- Apply the techniques from the course when solving programming/algorithm problems.
- Identify the best algorithm and/or data structure when solving a given programming problem.
- Analyze time and space required for the execution of a program, and recite the role of complexity analysis.

5 Program Goals

- **IT Core 1:** Classify a problem and define computing requirements appropriate to its solution. [Knowledge],[Comprehension]
- **IT Core 2:** Apply knowledge of current techniques, skills, and tools necessary to support best computing practices within the Information Technology field. [Application]
- **IT Core 4:** Identify and recognize user needs in the selection, creation, evaluation and administration of computer-based systems. [Knowledge], [Analysis]

6 Materials and Access

Important material from the text and outside sources will be covered during our scheduled class meetings. Regular attendance and in-class note-taking are critical. This course requires a lot of time, effort and energy. Students are strongly encouraged to **do background reading before and after** each class to gain a better grasp of the material. Corresponding chapters for each lecture will be indicated. The primary references are:

Title	Data structures and Algorithms in Java - 2nd Edition
Author(s)	Robert Lafore
Publisher	Sams
ISBN	978-067232454-9
URL	`https://goo.gl/KjMA3p`

Title	Introduction to Algorithms - 3rh edition
Author(s)	Thomas H. Cormen and *et al*
Publisher	MIT Press
ISBN	978-0262033938
URL	`https://goo.gl/KjMA3p`

Most of the material discussed in this course are well-explained in the titles above. These references are optional. They can be replaced by other online sources as long as the discussed topics are covered.

7 Course Delivery

7.1 On Campus

Important material from the text and outside sources will be covered during our regularly scheduled class meetings. Regular attendance is critical and students should take careful notes. Discussion is encouraged, as is student-procured outside material relevant to topics being covered. Bring your notebook, textbook, and other required materials to every class meeting.

As the nature of the material requires hands-on practical sessions, and since there are no practical sessions set in the schedule, different practical sessions will be conducted during the scheduled hours for the class. This might span over more than one meeting.

7.2 Online

Lectures in this course are delivered using multiple methods as per the contents of each lecture material, including but not limited to PowerPoint slides, software demonstrations, recorded lecture videos, and live sessions that involve lecturing, demonstrations, and discussions.

The main exchange platform for the materials with students is Moodle. The course profile on Moodle can be accessed from the URL shared in Section 1 above. Various resources will be shared on the course's Moodle page including important and continuous updates. For example, PDF files of the PowerPoint slides, links to the lecture videos that will be shared via YouTube, as well as links to live Zoom sessions and office hours.

Students are required to check Moodle for continuous updates, notifications, plans, and expectations without receiving further notifications from the professor via email, for example. Any information posted on Moodle is the responsibility and obligation of the students to check, understand, and follow.

8 Grading Procedures

The purpose of the below assessments is to provide you, the learner, with feedback regarding your level of knowledge, skills and competencies related to the above Course Learning Outcomes. Your performance on these items is also used to determine your overall final grade for the course.

Assessment Type	**Grade %**
Class Participation	10
3 Group Coursework Assignments	45
1 Individual Coursework Assignment	15
Comprehensive Final Exam	30
Total	**100**

Please note that Assignments/assessments are due in class on the day indicated. Quizzes, Tests and Exams may cover material from the readings that were not presented in class.

9 Grading Scale

A number based grading system will be used throughout the course for the assessments. However, the final grade will use a letter based grading system which will be calculated based on the following scale:

A	(4.0)	93 - 100	Superior
A -	(3.7)	90 - 92	
B +	(3.3)	87 - 89	Good
B	(3.0)	83 - 86	
B -	(2.7)	80 - 82	
C +	(2.3)	77 - 79	Satisfactory
C	(2.0)	73 - 76	
C -	(1.7)	70 - 72	
D +	(1.3)	67 - 69	Unsatisfactory
D	(1.0)	60 - 66	
F	(0)	Below 60	Fail

10 Attendance policy

Students are expected to attend all scheduled classes, arrive on time, and remain in class until dismissed. Tardiness and early departure are disruptive for students and the teacher and are unacceptable. Attendance will be taken at the beginning of each class.

As per university policy for classes that meet **two** times a week at the **sixth** absence the student will be dismissed from the course with a grade of

F. This cutoff is **absolute**. Per university policy as stated in the Academic Catalog, there are no excused absences. At the penultimate absence, the professor must notify students via e-mail that they are in danger of failing the course, with a copy to the Dean of Students.

11 Attendance Policy (Online)

If you are a student taking the course online, you are expected to attend online sessions or watch videos offline. The links to the recorded lectures will be provided on a lecture basis.

12 Course Policies and Expectations

12.1 Classroom Conduct

In this course, a premium is placed on listening, discussion, and participation. These sorts of activities are only possible in a classroom where the person speaking is accorded respect. In short, we all should listen to the one person who is speaking.

Students are expected to behave in a collegial manner at all times when in class. Rude, disrespectful, aggressive, or threatening language or behavior will not be tolerated, and students displaying this will be removed from class. Attire should be appropriate for university students. Distracting behavior will not be tolerated, and students behaving in this way will be asked to leave the class. Examples of distracting behavior include:

- Speaking languages other than English
- Face masks are monitory.
- Any other behavior which a student is warned against during class

Professionalism and ethical behavior are expected from students. Your instructor is not an encyclopedia, nor this course encourages memorization. Instead, this course aims to develop a deep understanding of the material. Students conduct should be guided by the AUIS Honor Code and the AUIS Academic Catalogue (both available online at www.auis.edu.krd).

12.2 Moodle

This course has a Moodle site that will be used for **announcements** and **posting material**. Enrollment is **mandatory**. The enrollment key will be provided during our first class meeting.

12.3 Office Hours

All students are invited to visit the instructor in his office, outside of class time. Apart from office hours, students can **make appointments** to visit at other times. Visits during office hours may be used to ask questions about the course material and content, clarify assignments or graded tests, explore ideas or topics related to or extending from the course material, and other course-related matters.

12.4 Makeup Exams and Extra Credit Policy

Makeup exams, extra credits,etc are not available in this course.

12.5 Expectations of Student Time

AUIS adheres to the United States federal definition of a credit hour, as established by the US Department of Education. As a three credit-hour course, you are expected to attend three hours of direct instruction per week, and spend a minimum of six hours out of class per week in studying, preparing, and otherwise engaging with the material of this course.

12.6 Late or Missed Submissions

Time-management and the meeting of harsh deadlines are part of the soft skills expected of all AUIS graduates. As a result, students should submit all coursework by the published deadline.

A coursework submitted within **48 hours** after the deadline is considered as a **late submission**. Each student can have **two** late submissions. A **penalty of 25 percentage marks** will be applied to each late submission, i.e. the submitted coursework will be graded out of 75%. Any additional late submissions will be awarded a mark of **zero** and there will be no make-ups offered for missed assignments.

12.7 Grade Disputes

Any questions about a grade earned on an assignment or test should be brought to the instructor directly. All assignments may be discussed in details during office hours, and any disputes concerning grades may be addressed at that time. If there is a dispute concerning the final grade for the course, students have the right to make a formal grade appeal. Details on this process can be found in the *academic catalog*.

12.8 Incomplete Grades

In the unlikely event that it becomes necessary to assign an "I", for incomplete, as the final grade in the course, the affected student(s) and professor

will adhere to the incomplete grade policy on page 22 (please check in new catalogue) of the Academic Catalog.

12.9 Revisions to the Syllabus

The syllabus is designed mainly around the course description proposed and announced to the students. Additional material may be introduced from other resources and certain sections of the recommended books may be left out as the professor sees it fit the course. Therefore, this syllabus is subject to change. It is the duty of the professor to inform students of changes in a timely fashion. Students are obliged to be cognizant of any change.

13 Emergency Evacuation

In case of an emergency or a fire alarm during a class, all students must follow the directions of the class/laboratory instructor and evacuate the room in an orderly manner to the assembly area. Failure to do so is a violation of AUIS Health and Safety Policy on emergency evacuation and will be subject to disciplinary action.

14 Academic Integrity

Academic Integrity is honest behavior in a school setting. Academic integrity is more than the absence of cheating. It is necessary for students to truly learn new skills and develop as human beings. By struggling with her own studies and by making honest mistakes and discoveries, a student learns about the world and herself. Using another's work inappropriately prevents this intellectual and emotional growth.

Academic Dishonesty ("cheating") is any form of deceit, fraud, or misrepresentation in academic work. Academic dishonesty is the opposite of learning, because it prevents the student-writer from genuinely learning and responding to material. Plagiarism is one of the most serious forms of academic dishonesty.

Plagiarism is using other people's ideas and/or words without clearly acknowledging the source of the information. If a student uses content or grammatical structures from the internet, a professional writer, or another student and does not inform the reader, he plagiarizes. A student who allows another student to use his writing without attribution is also guilty of plagiarism.

Cheating will not be tolerated in this class. All major written assignments completed outside of class time must be submitted via www.turnitin.com. A student found to be cheating for the first time will receive a zero for the assignment and the Dean of Students will be notified. In the event of a second

offense confirmed by the Dean of Students, the student will fail the course. A third instance of cheating will result in that student being dismissed from the American University of Iraq, Sulaimani. Students are directed to the AUIS Honor Code and the Academic Integrity policy section of the Academic Catalog (available online at www.auis.edu.krd). These documents provide guidance in cases of academic dishonesty, so we should all be familiar with them.

At the end of each assignment the following statement should be added and signed:

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I pledge that I have neither given nor received any unauthorized
assistance on this academic assignment, exercise, or examination.

Signed :__________
ID: ______________
Section: _________
Date: ____________
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Intellectual Property Rights Any code or work that you submit as part of lab works, exams, or assignments for the course becomes the property of the university. The professor therefore, has full rights to reuse, distribute, and share the code with others for educational purposes in future classes of any course where the material may serve such a purpose.

15 Course Schedule

Week	Starting Date	Topic
1	Feb. 7, 2020	Introduction to Algorithms
2	Feb. 14, 2020	Computational Complexity
3	Feb. 21, 2020	OOP Recap
4	Feb. 28, 2020	Sorting Algorithms - Part 1
		Assignment 1 due to Mar. 1, at 9 A.M.
5	Mar. 7, 2020	Sorting Algorithms - Part 2
6	Mar. 14, 2020	Searching problems
7	Mar. 21, 2020	Stacks and Queues
		Assignment 2 due to Mar. 22, at 9 A.M.
8	Mar. 28, 2020	Linked lists
9	Apr. 4, 2020	Merging problems
10	Apr. 11, 2020	Binary Search Trees - Part 1
		Assignment 3 due to Apr. 12, at 9 A.M.
11	Apr. 18, 2020	Binary Search Trees - Part 2
12	Apr. 25, 2020	Hash Tables
13	May 2, 2020	Graphs - Part 1
		Assignment 4 due to May 3, at 9 A.M.
14	May 16, 2020	Graphs - Part 2
		May 20 - Final Day of Classes
15	May 23, 2020	**AUIS Final Exams**