



Faculty : Faculty of Information Technology
Department: Computer Science
Academic Year: 2017/2018
Semester : First

(Course Syllabus)

Subject Name	Credit Hours	Course No.	Prerequisite	Concurrent course
Data Structures and Algorithms	3	1301203	1301108 + 1301110	

Coordinator Name	Lecturer/s	Room No.	E-mail	Course website	Office Hours
Mrs. Hebatullah Khattab	Mrs. Hebatullah Khattab	1G09	h_awwad@asu.edu.jo	http://bio.asu.edu.jo/bio/index.jsp	Posted on office door

Course Description:

Upon completion of this course, students will have learned how to build OOP data structures such as arrays, linked lists, stacks, queues, binary trees, hash tables, and graphs using classes and templates. Famous data structures applications such as queues and stacks will also be covered. Also, they will learn basic searching and sorting techniques.

Course Aims:

This course covers the fundamental aspects of building data structures in Java.

ABET Student Outcomes

- (b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
- (d) An ability to function effectively on teams to accomplish a common goal.
- (i) An ability to use current techniques, skills, and tools necessary for computing practice.
- (j) An 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.

Intended Learning Outcomes:

Following the successful completion of this course, the student should be able to:

A. Knowledge and Understanding:

- A1. Define and describe common data structures and algorithms. ABET (b)
- A2. Recognize the basic sorting and searching techniques. ABET (i)
- A3. Identify the time complexity. ABET (j)

B. Subject Specific Skills:

- B1. Write programs in Java with greater confidence. ABET (i)
- B2. Use object oriented methods to code different data structures. ABET (i)
- B3. Use data structures to build complex algorithms. ABET (j)

C. Cognitive and Intellectual Skills:

- C1. Specify the most appropriate data structure for a particular problem. ABET (j)
- C2. Identify a number of important computer algorithms that use those structures. ABET (j)
- C3. Analyse an algorithm for time and space efficiency. ABET (i)

D. Transferable Skills:

D1. Solve problems using a variety of data structures and algorithms. ABET (d), (j)

D2. Employ different data structures and algorithms in programs design and implementation. ABET (b), (i)

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

<i>ILOs</i>	<i>Learning Methods</i>	<i>Evaluation Methods</i>
A1 – A3	Lecturing and practical sessions	Exams and quizzes.
B1 – B3	Practical sessions, assignments and case studies.	Assignments and experiments in the lab.
C1 – C3	Lecturing and practical sessions.	Exams and experiments in lab.
D1 – D2	Practical sessions and assignments	Experiments in lab, assignments and quizzes

Learning skills:**Course Content:**

<i>Week</i>	<i>Date</i>	<i>Lecture number</i>	<i>Topic's Details</i>	<i>Exams/ /quizes/ holidays</i>	<i>Main Reference (chapter)</i>	<i>ILOs achieved</i>
1	8/10/17	1	Classes, Objects		Chapter 1	B1, B2
	10/10/17	2	Data Structures		Chapter 1	A1, B2
2	15/10/17	3	Basic Structuring Mechanisms		Chapter 1	A1, B2
	17/10/17	4	Abstract Data Types		Chapter 2	B1, B2
3	22/10/17	5	Lists: Arrays		Chapter 1, 6	A1, A3, B1, B2, C2, C3
	24/10/17	6	Lists: Introduction to Linked Lists		Chapter 6, 7	A1, A3, B1, B2, C2, C3, D1, D2
4	29/10/17	7	Types and Operation of Linked List		Chapter 6, 7	A3, B1, B2
	31/10/17	8	Formal Specification and Reference-based Implementation of a Linked List		Chapter 6, 7	B1-B3, C1, C2, D1, D2
5	5/11/17	9	Circular Linked List		Chapter 7	A1, A3, B1-B3
	7/11/17	10	Circular Linked List		Chapter 7	B1, B2, C1, C2, D1, D2
6	12/11/17	11	Doubly Linked List	FIRST EXAM	Chapter 7	A1, A3, B1-B3
	14/11/17	12	Doubly Linked List	FIRST EXAM	Chapter 7	B1, B2, C1, C2, D1, D2
7	19/11/17	13	Stack: uses and formal specification of the stack	FIRST EXAM	Chapter 3	A1, B1, B2, B3
	21/11/17	14	Stack interface and array-based implementation	FIRST EXAM	Chapter 3	B1, B2, C1, C2, D1, D2
8	26/11/17	15	Linked Stack interface, class		Chapter 3	A1, B1, B2, C1,

			and operations			C2, D1, D2
	28/11/17	16	Linked Stack example	Assignment	Chapter 3	B1, B2,C1, C2, D1, D2
9	3/12/17	17	Queue uses and formal specification		Chapter 5	A1, B1, B2, B3
	5/12/17	18	Array-based implementation of the queue		Chapter 5	B1, B2,C1, C2, D1, D2
10	10/12/17	19	Linked Queue interface, class, and oprations		Chapter 5	A1, B1, B2,C1, C2, D1, D2
	12/12/17	20	Linked Queue example		Chapter 5	B1, B2,C1, C2, D1, D2
11	17/12/17	21	Recursion definition and example	SECOND EXAM	Chapter 4	B1-B3, C1, C2
	19/12/17	22	Recursion algorithms	SECOND EXAM	Chapter 4	A3, B1-B3, C1-C3, D1, D2
12	24/12/17	23	Trees: definition and traverse	SECOND EXAM	Chapter 8	A1, B1-B3, C1-C3, D1, D2
	26/12/17	24	Binary search tree	SECOND EXAM	Chapter 8	A1, B1-B3, C1-C3, D1, D2
13	31/12/17	25	Graphs: definition and examples	Quiz	Chapter 9	A1, B1-B3, C1-C3, D1, D2
	2/01/18	26	Graphs: more examples	Final Lab Exam	Chapter 9	B1-B3, C1-C3, D1, D2
14	7/01/18	27	Searching definition and major algorithms	Final Lab Exam	Chapter 10	A2, A3, B1-B3, C1-C3, D1,D2
	9/01/18	28	Linear and Binary Search algorithms		Chapter 10	A2, A3, B1-B3, C1-C3, D1,D2
15	14/01/18	29	Sorting definition and major algorithms		Chapter 10	A2, A3, B1-B3, C1-C3, D1,D2
	16/01/18	30	Bubble and Selection Sort algorithms		Chapter 10	A2, A3, B1-B3, C1-C3, D1,D2
16	21/01/18	31		FINAL EXAM		
		32		FINAL EXAM		
				FINAL EXAM		

Grade Distribution:

Your course grade will be determined by the following:

<i>Assessment Method</i>	<i>% of Final Grade</i>	<i>Due Date</i>
- First Exam	20%	As clarified above
- Second Exam	20%	
- Lab (Assignments, Quizzes, Tutorials,)	Final lab 15% Project & HW 15%	
- Final Examination	30%	

*Distribution of examination material (may vary depending on material included)

Course Policies:

A. Attendance policies:

Attendance: Mandatory.

First warning – with ___5___ absences

Last warning – with ___7___ absences

Failing in the subject – with ___8___ absences

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

Will result in zero achievement unless health report or other significant excuse is documented.

C. Health and safety procedures:

D. Honesty policy regarding cheating, plagiarism, misbehavior:

The participation, the commitment of cheating will lead to applying one or more of the following penalties together:

1. Failing the subject he/she cheated at
2. Failing the other subjects taken in the same course
3. Not allowed to register for the next semester. The summer semester is not considered as a semester

E. Grading policy:

Exams and Quizzes.

First Exam: ___20___ points

Second Exam: ___20___ points

Assignments/quizzes + Final Lab: ___15 +15___ points

Final Exam: ___30___ points

Total: ___100___ points

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

Required Equipment and Tools:

Make-up Exam Policy:

Make-up exams will be offered for valid reasons. They may be different from regular exams in content and format.

Textbooks information:

Object-Oriented Data Structures Using Java, 3rd edition, By Nell Dale, Daniel Joyce, Chip Weems, 2012.

Main Reference:

<http://bio.asu.edu.jo/bio/index.jsp>

Other References:

1. Data Structures Using Java, 1st edition, D.S Malik, 2003
2. Data Structures And Algorithms Made Easy In Java, By Narasimha Karumanchi, CareerMonk Publications, 2011.
3. Data Structures and Algorithms in Java, 2nd edition, Robert Lafore, 2006.
4. Handouts and slides to be distributed by lecturers.

Additional information:

No side talks during lecture
No mobile phones during lecture
Entering the lecture theatre after the instructor is not permitted.

Homework should be done by students independently and will be asked at the exams

Course Material and Announcements:

Students need to use the e-learning page at the ASU website in order to get all lecture handouts and guidelines which will be uploaded there.

In addition, course related announcements and exam results will be posted on the e-learning page and is the responsibility of each student to check the site regularly.

Name of Course Coordinator: Mrs. Hebatullah Khattab

Signature: _____

Date: _____

Head of curriculum committee: Dr. Nedhal ALSaiyd

Signature: _____

Date: _____

Head of Department: Dr. Fadi Almasalha

Signature: _____

Date: _____

Dean: Dr. Mohammed Hijjawi

Signature: _____

Date: _____

Copy to:

Head of Department

Head of curriculum committee

Course File

C 26



Faculty: Faculty of Information Technology
Department: Computer Science
Academic Year: 2017/2018
Semester: First

(Course Syllabus)

Subject Name	Credit Hours	Course No.	Prerequisite	Concurrent course
Data Structures and Algorithms	3	1301203	1301108 + 1301110	

Coordinator Name	Lecturer/s	Room No.	E-mail	Course website	Office Hours
Mrs. Hebatullah Khattab	Mrs. Hebatullah Khattab	1G09	h_awwad@asu.edu.jo	http://bio.asu.edu.jo/bio/index.jsp	Posted on office door

Course Description:

Upon completion of this course, students will have learned how to build OOP data structures such as arrays, linked lists, stacks, queues, binary trees, hash tables, and graphs using classes and templates. Famous data structures applications such as queues and stacks will also be covered. Also, they will learn basic searching and sorting techniques.

Course Aims:

This course covers the fundamental aspects of building data structures in Java.

ABET Student Outcomes

- (b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
- (d) An ability to function effectively on teams to accomplish a common goal.
- (i) An ability to use current techniques, skills, and tools necessary for computing practice.
- (j) An 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.

Intended Learning Outcomes:

Following the successful completion of this course, the student should be able to:

E. Knowledge and Understanding:

- E1. Define and describe common data structures and algorithms. ABET (b)
- E2. Recognize the basic sorting and searching techniques. ABET (i)
- E3. Identify the time complexity. ABET (j)

F. Subject Specific Skills:

- F1. Write programs in Java with greater confidence. ABET (i)
- F2. Use object oriented methods to code different data structures. ABET (i)
- F3. Use data structures to build complex algorithms. ABET (j)

G. Cognitive and Intellectual Skills:

- G1. Specify the most appropriate data structure for a particular problem. ABET (j)
- G2. Identify a number of important computer algorithms that use those structures. ABET (j)
- G3. Analyse an algorithm for time and space efficiency. ABET (i)

H. Transferable Skills:

H1. Solve problems using a variety of data structures and algorithms. ABET (d), (j)

H2. Employ different data structures and algorithms in programs design and implementation. ABET (b), (i)

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

<i>ILOs</i>	<i>Learning Methods</i>	<i>Evaluation Methods</i>
A1 – A3	Lecturing and practical sessions	Exams and quizzes.
B1 – B3	Practical sessions, assignments and case studies.	Assignments and experiments in the lab.
C1 – C3	Lecturing and practical sessions.	Exams and experiments in lab.
D1 – D2	Practical sessions and assignments	Experiments in lab, assignments and quizzes

Learning skills:**Course Content:**

<i>Week</i>	<i>Date</i>	<i>Lecture number</i>	<i>Topic's Details</i>	<i>Exams/ /quizes/ holidays</i>	<i>Main Reference (chapter)</i>	<i>ILOs achieved</i>
1	9/10/17	1	Classes, Objects		Chapter 1	B1, B2
	11/10/17	2	Data Structures		Chapter 1	A1, B2
2	16/10/17	3	Basic Structuring Mechanisms		Chapter 1	A1, B2
	18/10/17	4	Abstract Data Types		Chapter 2	B1, B2
3	23/10/17	5	Lists: Arrays		Chapter 1, 6	A1, A3, B1, B2, C2, C3
	25/10/17	6	Lists: Introduction to Linked Lists		Chapter 6, 7	A1, A3, B1, B2, C2, C3, D1, D2
4	30/10/17	7	Types and Operation of Linked List		Chapter 6, 7	A3, B1, B2
	1/11/17	8	Formal Specification and Reference-based Implementation of a Linked List		Chapter 6, 7	B1-B3, C1, C2, D1, D2
5	6/11/17	9	Circular Linked List		Chapter 7	A1, A3, B1-B3
	9/11/17	10	Circular Linked List		Chapter 7	B1, B2, C1, C2, D1, D2
6	13/11/17	11	Doubly Linked List	FIRST EXAM	Chapter 7	A1, A3, B1-B3
	15/11/17	12	Doubly Linked List	FIRST EXAM	Chapter 7	B1, B2, C1, C2, D1, D2
7	20/11/17	13	Stack: uses and formal specification of the stack	FIRST EXAM	Chapter 3	A1, B1, B2, B3
	22/11/17	14	Stack interface and array-based implementation	FIRST EXAM	Chapter 3	B1, B2, C1, C2, D1, D2

8	27/11/17	15	Linked Stack interface, class and operations		Chapter 3	A1, B1, B2,C1, C2, D1, D2
	29/11/17	16	Linked Stack example	Assignment	Chapter 3	B1, B2,C1, C2, D1, D2
9	4/12/17	17	Queue uses and formal specification		Chapter 5	A1, B1, B2, B3
	6/12/17	18	Array-based implementation of the queue		Chapter 5	B1, B2,C1, C2, D1, D2
10	11/12/17	19	Linked Queue interface, class, and operations		Chapter 5	A1, B1, B2,C1, C2, D1, D2
	13/12/17	20	Linked Queue example		Chapter 5	B1, B2,C1, C2, D1, D2
11	18/12/17	21	Recursion definition and example	SECOND EXAM	Chapter 4	B1-B3, C1, C2
	20/12/17	22	Recursion algorithms	SECOND EXAM	Chapter 4	A3, B1-B3, C1-C3, D1, D2
12	25/12/17	23	Xmas Day	Xmas Day		
	27/12/17	24	Trees: definition and traverse, Binary search tree	SECOND EXAM	Chapter 8	A1, B1-B3, C1-C3, D1, D2
13	1/01/18	25	New Year	New Year		
	3/01/18	26	Graphs: definition and example	Quiz	Chapter 9	B1-B3, C1-C3, D1, D2
14	8/01/18	27	Searching definition and major algorithms	Final Lab Exam	Chapter 10	A2, A3, B1-B3, C1-C3, D1,D2
	10/01/18	28	Linear and Binary Search algorithms	Final Lab Exam	Chapter 10	A2, A3, B1-B3, C1-C3, D1,D2
15	15/01/18	29	Sorting definition and major algorithms		Chapter 10	A2, A3, B1-B3, C1-C3, D1,D2
	17/01/18	30	Bubble and Selection Sort algorithms		Chapter 10	A2, A3, B1-B3, C1-C3, D1,D2
16	22/01/18	31		FINAL EXAM		
		32		FINAL EXAM		
				FINAL EXAM		

Grade Distribution:

Your course grade will be determined by the following:

<i>Assessment Method</i>	<i>% of Final Grade</i>	<i>Due Date</i>
- First Exam	20%	As clarified above
- Second Exam	20%	
- Lab (Assignments, Quizzes, Tutorials,)	Final lab 15% Project & HW 15%	
- Final Examination	30%	

*Distribution of examination material (may vary depending on material included)

Course Policies:

G. Attendance policies:

Attendance: Mandatory.

First warning – with ___5___ absences

Last warning – with ___7___ absences

Failing in the subject – with ___8___ absences

H. Absences from exams and handing in assignments on time:

Will result in zero achievement unless health report or other significant excuse is documented.

I. Health and safety procedures:

J. Honesty policy regarding cheating, plagiarism, misbehavior:

The participation, the commitment of cheating will lead to applying one or more of the following penalties together:

- 4. Failing the subject he/she cheated at
- 5. Failing the other subjects taken in the same course
- 6. Not allowed to register for the next semester. The summer semester is not considered as a semester

K. Grading policy:

Exams and Quizzes.

First Exam: ___20___ points

Second Exam: ___20___ points

Assignments/quizzes + Final Lab: ___15 +15___ points

Final Exam: ___30___ points

Total: ___100___ points

L. Available university services that support achievement in the course:

Required Equipment and Tools:

Make-up Exam Policy:

Make-up exams will be offered for valid reasons. They may be different from regular exams in content and format.

Textbooks information:

Object-Oriented Data Structures Using Java, 3rd edition, By Nell Dale, Daniel Joyce, Chip Weems, 2012.

Main Reference:

<http://bio.asu.edu.jo/bio/index.jsp>

Other References:

- 5. Data Structures Using Java, 1st edition, D.S Malik, 2003
- 6. Data Structures And Algorithms Made Easy In Java, By Narasimha Karumanchi, CareerMonk Publications, 2011.
- 7. Data Structures and Algorithms in Java, 2nd edition, Robert Lafore, 2006.
- 8. Handouts and slides to be distributed by lecturers.

Additional information:

No side talks during lecture
No mobile phones during lecture
Entering the lecture theatre after the instructor is not permitted.

Homework should be done by students independently and will be asked at the exams

Course Material and Announcements:

Students need to use the e-learning page at the ASU website in order to get all lecture handouts and guidelines which will be uploaded there.

In addition, course related announcements and exam results will be posted on the e-learning page and is the responsibility of each student to check the site regularly.

Name of Course Coordinator: Mrs. Hebatullah Khattab

Signature: _____

Date: _____

Head of curriculum committee: Dr. Nedhal ALSaiyd

Signature: _____

Date: _____

Head of Department: Dr. Fadi Almasalha

Signature: _____

Date: _____

Dean: Dr. Mohammed Hijjawi

Signature: _____

Date: _____

Copy to:

Head of Department

Head of curriculum committee

Course File

C 26