ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specifications
(CS)

Course Specifications

Institution	Al Yamamah University	Date of Report Fall Semester 2013-14
College/Department Computer and Information Systems		

A. Course Identification and General Information

1. Course title and code: CIS 202: Data Structures
2. Credit hours: 3
3. Program(s) in which the course is offered. Bachelor of Computer and Information Systems
(If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Raed Shatnawi
5. Level/year at which this course is offered: 2nd year
6. Pre-requisites for this course (if any): CIS 102 Programming Fundamentals II
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	X	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. e-learning		What percentage?	
d. Correspondence		What percentage?	
f. Other		What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course? The main purpose of the course is to enable students to describe the basic data structures, algorithms and programming techniques, including lists, stack, queues, search trees, hash tables, different sorting algorithms, search algorithms for graphs, and dynamic programming.
2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field) The latest applications of OO programming for data structures in Java.

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

Object-oriented modeling techniques for analysis and design. Provides the tools and techniques needed to solve complex, real-world software engineering problems in an object-oriented manner, using the most effective elements of the Unified Process. The course covers the essential concepts and notation of the Unified Modeling Language (UML), the standard notation for object-oriented analysis and design. Team project.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
• Java Concepts: Inheritance and Polymorphism • Java Interfaces	1	3
• Arrays in Java: • Primitive Arrays • Array lists • Generics	2	6
• Java errors and exceptions handling	1	3
• Java built-in arrays sorting techniques	1	3
• Java Collection framework	1	3
• Algorithm analysis	2	6
• Using Hash and Tree collections	1	3
• Stacks • Queues • Computational complexity of some of the methods of the Java List interface	3	9
• Balanced Binary trees	1	3

• Maps and Hashing	1	3
• Priority queues	1	3
Total	15	45

2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	45	-	-	-	-	45
Credit	3	-	-	-	-	3

3. Additional private study/learning hours expected for students per week. 3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

Course Learning Outcomes, Assessment Methods, and Teaching Strategy work together and are aligned. They are joined together as one, coherent, unity that collectively articulate a consistent agreement between student learning, assessment, and teaching.

The ***National Qualification Framework*** provides five learning domains. Course learning outcomes are required. Normally a course has should not exceed eight learning outcomes which align with one or more of the five learning domains. Some courses have one or more program learning outcomes integrated into the course learning outcomes to demonstrate program learning outcome alignment. The program learning outcome matrix map identifies which program learning outcomes are incorporated into specific courses.

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. **Fourth**, if any program learning outcomes are included in the course learning outcomes, place the @ symbol next to it.
Every course is not required to include learning outcomes from each domain.

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge** After successful completion of the course students will be able to:		
1.1	Outline the basic data structures, algorithms and programming techniques, including lists, stack, queues, search trees, hash tables, different sorting algorithms, search algorithms for graphs, and dynamic programming.	Lectures Demonstration Group discussions.	Written exams (quizzes, mid-term, and final exams)
1.2	State how to apply the techniques from the course when solving programming/algorithm problems.	Lectures Demonstration Group discussions.	Homework Written exams (quizzes, mid-term, and final exams)
1.3	Describe how to select the best algorithm and/or data structure when solving a given programming problem.	Lectures Demonstration	Group work Assignments Oral presentations.
2.0	**Cognitive Skills** After successful completion of the course students will be able to:		
2.1	Analyze time and space required for the execution of a program, as well as the correctness of a program.	Design special case studies that promote cognitive skills and ability to seek comprehensive solutions. .	All assignments and tests include parts dedicated to the usage of investigation methodologies and cognitive skills. .
2.2	Formulate a given programming task as an algorithmic problem, in order to select the best method for solving it.	Encourage students to be actively involved in group projects and case studies to enable them to have an experience in teamwork situations	Assessment of course projects and case studies that promote critical thinking and the ability to solve problems
2.3	To combine and modify algorithms and data structures, in order to design an efficient program.	Programming tasks	assignments
3.0	**Interpersonal Skills & Responsibility** After successful completion of the course students will be able to:		
3.1	To cooperate constructively in groups.	Students are required to perform group presentations.	Monitoring and adjusting students' interpersonal skills and responsibility in teamwork context
3.2	Students should be responsible for using specific tools to search for new information, data and techniques of analysis.	Course work and assignments are designed to include tasks that require students to search for information on their own.	Evaluating students' interpersonal skills and responsibility in teamwork context
3.3	Adhere to ethical and professional values and moral judgments.	Students will be exposed to ethical and professional issues throughout the course.	Group discussion
3.4	Practice values relevant to the professional code.	Course discussions	Group discussion
4.0	**Communication, Information Technology, Numerical** After successful completion of the course students will be able to:		

4.1	Express themselves and communicate effectively in oral and written English.	Course tasks and assignments implement tasks that support the mentioned skills throughout the course.	Monitoring and grading students' performance on the above mentioned teaching strategies
4.2	Effectively research the web using various types of search engines and advanced searching techniques.		
4.3	Use the Al-Yamamah University information systems, such as: Students' email system, Students' Absence system (EDUGATE), Al-Yamamah Electronic Community (YEC), and e-registry.		
5.0	**Psychomotor** After successful completion of the course students will be able to:		
5.1	Demonstrate how to plan, organize, direct and control their activities as per the challenges of modern work environment.	Lectures, group discussions class room presentations, class activities and case studies.	Class participation, punctuality, computing skills and ability to meet deadlines at the labs and for activities during the semester.

Suggested Guidelines for Learning Outcome Verb, Assessment, and Teaching

NQF Learning Domains	Suggested Verbs
Knowledge	list, name, record, define, label, outline, state, describe, recall, memorize, reproduce, recognize, record, tell, write
Cognitive Skills	estimate, explain, summarize, write, compare, contrast, diagram, subdivide, differentiate, criticize, calculate, analyze, compose, develop, create, prepare, reconstruct, reorganize, summarize, explain, predict, justify, rate, evaluate, plan, design, measure, judge, justify, interpret, appraise
Interpersonal Skills & Responsibility	demonstrate, judge, choose, illustrate, modify, show, use, appraise, evaluate, justify, analyze, question, and write
Communication, Information Technology, Numerical	demonstrate, calculate, illustrate, interpret, research, question, operate, appraise, evaluate, assess, and criticize
Psychomotor	demonstrate, show, illustrate, perform, dramatize, employ, manipulate, operate, prepare, produce, draw, diagram, examine, construct, assemble, experiment, and reconstruct

Suggested ***verbs not to use*** when writing measurable and assessable learning outcomes are as follows:

Consider	Maximize	Continue	Review	Ensure	Enlarge	Understand
Maintain	Reflect	Examine	Strengthen	Explore	Encourage	Deepen

Some of these verbs can be used if tied to specific actions or quantification.

Suggested assessment methods and teaching strategies are:

According to research and best practices, multiple and continuous assessment methods are required to verify student learning. Current trends incorporate a wide range of rubric assessment tools; including web-based student performance systems that apply rubrics, benchmarks, KPIs, and analysis. Rubrics are especially helpful for qualitative evaluation. Differentiated assessment strategies include: exams, portfolios, long and short essays, log books, analytical reports, individual and group presentations, posters, journals, case studies, lab manuals, video analysis, group reports, lab reports, debates, speeches, learning logs, peer evaluations, self-evaluations, videos, graphs, dramatic performances, tables, demonstrations, graphic organizers, discussion forums, interviews, learning contracts, antidotal notes, artwork, KWL charts, and concept mapping.

Differentiated teaching strategies should be selected to align with the curriculum taught, the needs of students, and the intended learning outcomes. Teaching methods include: lecture, debate, small group work, whole group and small group discussion, research activities, lab demonstrations, projects, debates, role playing, case studies, guest speakers, memorization, humor, individual presentation, brainstorming, and a wide variety of hands-on student learning activities.

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Homework/Assignment/Project	3,6,11	20%
2	Punctuality and Attendance		10%
3	Midterm Exam	8	20%
4	Quizzes	7, 12	10%
5	Final Exam	16	40%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week) The number of office hours equals 50% of the number of teaching hours or more.

E. Learning Resources

1. List Required Textbooks Michael Goodrich and Roberto Tamassia (2011), Data Structures and Algorithms in Java, 5th edition, John Wiley and Sons, ISBN 978-0-470-39880-7.
2. List Essential References Materials (Journals, Reports, etc.) A Practical Guide to Data Structures and Algorithms using Java (Applied Algorithms and Data Structures)
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.) http://java.datastructures.net
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. Netbeans, Eclipse

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) Normal class room

2. Computing resources (AV, data show, Smart Board, software, etc.) Workstations equipped with Netbeans and/or Eclipse.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) None

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching During the course, students receive a feedback forms that covers all aspects relating to their learning experience. These forms will then be collected and analyzed by the Academic Advising and Counselling Department. Next, the Academic Advising and Counselling Department will conduct a meeting with the concerned faculty to discuss the students' feedback outcomes.
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor Peer review visits are normally conducted among faculties wherever possible during academic year. During the lecture time Chair (Head)/ Dean of the department visits the classroom. At the end of each visit, faculties are usually set together to discuss related issues.
3 Processes for Improvement of Teaching • Feedbacks from students using different types of survey are shown and discussed with faculty members to improve the teaching. • Specialized workshops and seminars are conducted throughout academic year to address specific teaching strategies and improvements.
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution) Peer review and discussion with course coordinator. There should be a strong liaison with teacher from some external university/institute in order to exchange ideas related to marking/ evaluating quizzes and assignments. .

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. At the end of each semester, Curriculum committee conducts a meeting with all faculty members in which surveys filled by the students and other feedbacks from faculty members are discussed. Effectiveness of the courses, mistakes done and weaknesses are discussed. These points are made basis for the planning for improvements for next semester/ year.

Faculty or Teaching Staff: Dr. Raed Shatnawi _____

Signature: _____ **Date Report Completed:** _____

Received by: _____ **Dean/Department Head**

Signature: _____ **Date:** _____