4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: **CODING THEORY**

Course Code: 4046406-4

Course Specifications

Institution: Umm Al-Qura University	Date
College/Department : College of Applied Science / Department of Mathematical Sciences	

A. Course Identification and General Information

1. Course title and code: Coding Theory 4046406-4			
2. Credit hours 4			
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) Master in Mathematics			
4. Name of faculty member responsible for the course : Prof. Ahmed A Khammash			
5. Level/year at which this course is offered (2nd Year)			
6. Pre-requisites for this course (if any) 4046401-4 + 4043404-3 + 4044407-3 + 4046402-4			
7. Co-requisites for this course (if any)			
8. Location if not on main campus Alabdiya and alzaher			
9. Mode of Instruction (mark all that apply)			
a. traditional classroom	√	What percentage?	85
b. blended (traditional and online)		What percentage?	
c. e-learning	√	What percentage?	15
d. correspondence		What percentage?	
f. other		What percentage?	
Comments:			

B Objectives

1. What is the main purpose for this course? To introduce the students to coding theory. This includes the concept and different method of describing codes as well as main theorems concerning the main aim of coding theory
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) In certain stage of the course the students will be introduced to certain computer packages which deal with coding theory such as MATLAB, GAP … etc

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description: This is a 4 credit hours optional course comprising approximately 60 hours of lectures.

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact hours
Introduction to coding theory : Basic assumption – weight and distance - Generating and check matrices- Encoding- Error correcting codes ; the main problem of coding theory	2	8
Linear Codes: Codes over finite fields – Equivalent codes - Cyclic linear Codes	2	8
BCH Codes: Finite fields – Minimal polynomials – Cyclic Hamming codes - Decoding 2 error_correcting BCH code	2	8
Reed-Solomon Codes: Codes over $GF(2^r)$, Reed-Solomon codes	2	8
Reed- Muller Codes : Constructing Reed-Muller codes – Decoding Reed-Muller codes	2	8
Codes and Group Rings: The notion of group rings and their structure, Linear codes as ideals in group rings, Group rings as matrices, unit-type codes, Zero divisors type codes.	3	12
Recent conjectures and open problems in this field.	2	8

2. Course components (total contact hours and credits per semester): 21 contact hours (3 credits)						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total

			or Studio			
Contact Hours	60					60
Credit	4					4

3. Additional private study/learning hours expected for students per week.
Three hours weekly for homework and revision

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

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. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Knowing the basic set up of codes (how to describe a linear code)	Lectures and tutorials	Quizzes, periodical and final exams
1.2	The student will also aware of different kinds of codes and their coding capacities	Lectures and tutorials	Quizzes, periodical and final exams
2.0	**Cognitive Skills**		
2.1	Constructing codes of certain parameters. Distinguishing between codes by equivalence.	Lectures and tutorials	Quizzes, periodical and final exams
2.2	Judging codes according to their coding capacities.	Lectures and tutorials	Quizzes, periodical and final exams
3.0	**Interpersonal Skills & Responsibility**		
3.1	Develop the students ability towards working in small teams and discuss matters loudly and	Working in small groups	Oral Presentations

	critically		
3.2	Develop independent thinking and judging	Working in small groups	Oral Presentations
4.0	**Communication, Information Technology, Numerical**		
4.1	Knowing and getting used to the existing computer packages such as GAP, MATLAB	Directions and Homework	Homeworks
5.0	**Psychomotor** NOT APPLIED		

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	First periodical	6	20
2	Second periodic exam	10	20
3	Homework and tutorial activities	Over all weeks	20
5	Final Exam	End	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 instructor is available during office hours for at least six hours per week. He is also available on appointments

E Learning Resources

1. List Required Textbooks
(1) Hoffman et. al. , Coding Theory the essentials , DEKKER #150, 1992

(2) Vera Pless , Introduction to the theory of Error-Correcting Codes, WILEY 1990

(3) Steven Roman , Coding and Information Theory, Springer-Verlag 1992.

2. List Essential References Materials (Journals, Reports, etc.)
According to the needs along the semester

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
GAP (groups , algorithms and programming) Website

5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. The algebra computer package GAP as well as other packages such as MATLAB

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.) A class of capacity 15 as well as computer lab of the same capacity
2. Computing resources (AV, data show, Smart Board, software, etc.) The computer lab should be equipped with the following packages GAP , MATLAB and MATHEMATICA
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching Regular polls as well as direct discussions
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching Updating knowledge of new trends in teaching beside peer consultations and reviews
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 consultations and reviews
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. By regulations, the whole study plan as well as individual courses should be reviewed , revised and updated for improvement and this is done on a regular basis

Name of Instructor: Prof Ahmed Khammash
Signature: Ahmed Khammash Date Report Completed: 20/2/ 2018
Name of Field Experience Teaching Staff Algebra (Representation Theory)
Program Coordinator:_____
Signature: _____ Date Received: 20/2/2018