



ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

**Course Specifications
(CS)**

MATH 132 (Logic Mathematics)



Course Specifications

| | |
|---|----------------------------|
| Institution: King Saud University | Date of Report: 25/03/2017 |
| College/Department : College of Sciences / Mathematics Department | |

A. Course Identification and General Information

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|---|-------------------------------------|------------------|-----------------------------------|
| 1. Course title and code: Logic Mathematics (MATH 132) | | | |
| 2. Credit hours: 3 (2+1+0) | | | |
| 3. Program(s) in which the course is offered: Bachelor of Actuarial and Financial Mathematics | | | |
| 4. Name of faculty member responsible for the course: | | | |
| 5. Level/year at which this course is offered: Level 3/ Second year | | | |
| 6. Pre-requisites for this course: None | | | |
| 7. Co-requisites for this course: None | | | |
| 8. Location if not on main campus: - | | | |
| 9. Mode of Instruction (mark all that apply) | | | |
| a. Traditional classroom | <input checked="" type="checkbox"/> | What percentage? | <input type="text" value="100%"/> |
| b. Blended (traditional and online) | <input type="checkbox"/> | What percentage? | <input type="text"/> |
| c. e-learning | <input type="checkbox"/> | What percentage? | <input type="text"/> |
| d. Correspondence | <input type="checkbox"/> | What percentage? | <input type="text"/> |
| f. Other | <input type="checkbox"/> | What percentage? | <input type="text"/> |
| Comments: | | | |



B Objectives

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| <p>1. What is the main purpose for this course? The main purpose for this course is to introduce :</p> <p>1- Basic mathematical logic, 2- Methods of proof, 3- Basics of set theory, 4- Relations, mappings (functions), 5- Equivalence of sets, finite sets, countable sets, cardinal numbers.</p> |
| <p>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)</p> <p>Developing the course material to keep up with the new scientific and technological knowledge by:</p> <p>1. Updating the references, 2. Guiding the students to use the Internet, 3. Presenting different proofs of some mathematical results.</p> |

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

| 1. Topics to be Covered | | |
|--|--------------|---------------------------|
| List of Topics | No. of Weeks | Contact Hours (Lecture) |
| Mathematical Logic and Proof Methods | 4 | 8 |
| Sets and their Operations | 2 | 4 |
| Cartesian Product of Sets and its Properties | 2 | 4 |
| Binary Relations and their Properties | 2 | 6 |
| Mappings (Functions) | 3 | 6 |
| Equivalence of Sets, finite sets, countable sets, cardinal numbers | 2 | 4 |



| 2. Course components (total contact hours and credits per semester): | | | | | | |
|--|---------|----------|------------|-----------|--------|-------|
| | Lecture | Tutorial | Laboratory | Practical | Other: | Total |
| Contact Hours | 30 | 30 | None | None | None | 60 |
| Credit | 2 | 1 | None | None | None | 3 |

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| 3. Additional private study/learning hours expected for students per week. | 6 |
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| 4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy |
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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 studying this course, the student is expected to be able to: | | |
| 1.1 | Define logical equivalence, quantifiers, the contrapositive of a conditional statement, and state the basic rules of logical equivalence. | 1. Lectures: - Build on what students already know. - Present new concepts and principles in a systematic way. - Use questioning to involve students actively in the lecture. 2. Elicit practice through tutorials and provide feedback. | - Questioning in classes, - Quizzes, - Two mid-term exams, - Final Exam, - Homework assignments. |
| 1.2 | State different methods of proof. | | |
| 1.3 | Define the power set, set operations and state their main properties. | | |
| 1.4 | Define the Cartesian product, binary relation, equivalence relation, equivalence classes, order relations, partitions and state their main properties. | | |
| 1.5 | Define mappings (functions), injections, surjections, bijections, composition and inverse mappings (functions). | | |
| 1.6 | Define equivalence of sets, finite sets, and countable sets and give examples from sets of numbers. | | |
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| 2.0 | Cognitive Skills | | |
| | After studying this course, the student is expected to be able to: | | |
| 2.1 | Decide whether two statements are logically equivalent, and state the converse, inverse and contrapositive of a conditional statement. | -Ask students to prepare for and present short lectures. -Give students exercises with graded difficulties. -Give students homework assignments with the purpose of extending some theoretical parts of the course. | - Questioning in classes, - Quizzes, - Two mid-term exams, - Final Exam, - Homework assignments. |
| 2.2 | Generate proofs of theorems and solutions of problems using standard methods such as direct, contraposition, contradiction, counterexamples and mathematical induction. | | |
| 2.3 | Decide whether a given binary relation is an equivalence relation, a partial order or a total order and find the equivalence classes. | | |
| 2.4 | Decide whether a given mapping is an injection, a surjection or a bijection. Find the composition of functions and inverses of bijections. | | |



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| 2.5 | Decide whether two sets are equivalent, and whether a given set is countable. Give examples of countable sets and uncountable sets. | | |
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| 3.0 | Interpersonal Skills & Responsibility | | |
| | After studying this course, the student is expected to be able to: | | |
| 3.1 | Study, learn and work independently. | Encourage students to: - participate in class discussion. - participate in college and university activities. - be members of department committees and college committees. | |
| 3.2 | Work effectively in teams. | | |
| 3.3 | Meet deadlines and manage time properly. | | |
| 3.4 | Exhibit ethical behavior and respect different points of view. | | |
| 4.0 | Communication, Information Technology, Numerical | | |
| | After studying this course, the student is expected to be able to: | | |
| 4.1 | Present mathematics to others, both in oral and written form clearly and in a well-organized manner. | Encourage students to: - give presentations. - participate in competitions. - be members of department committees and college committees. - use department and college computing facilities websites, and central library. - use e-mail, internet, college and department | |
| 4.2 | Use IT facilities as an aid to mathematical processes and for acquiring available information. | | |
| 4.3 | Use library to locate mathematical information. | | |
| 5.0 | Psychomotor | | |
| | Not Applicable | Not Applicable | Not Applicable |

Suggested Guidelines for Learning Outcome Verb, Assessment, and Teaching

| NQF Learning Domains | Suggested Verbs |
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| Knowledge | list, name, record, define, label, outline, state, describe, recall, memorize, reproduce, recognize, record, tell, write |



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| 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 | First mid term | 7 | 25% |
| 2 | Second mid term | 12 | 25% |
| 3 | Quizzes and homework | weekly | 10% |
| 4 | Final examination | 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)

1. 10 office hours weekly.
2. Five minutes at the end of each lecture.
3. Encouraging students to get in touch with their teacher via e-mail or Department mail box.
4. 5 hours weekly for academic advice through the academic guidance unit of the department.

E. Learning Resources

1. List Required Textbooks:
Discrete Mathematics and Its Applications
Author: Kenneth H. Rosen
Publisher: Mc Graw Hill
7th edition, 2012

2. List Essential References Materials (Journals, Reports, etc.):
A First Course in Abstract Algebra.
Author: John B. Fraleigh
Publisher: Pearson.
7th edition, 2014

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

4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.):

1. Internet sites related to the course.
2. Teacher's site in math 132.



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| 5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. |

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.)

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| 1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.): 1. Lecture room to accommodate at least 30 students. 2. A large black board or two attached ones. |
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| 2. Computing resources (AV, data show, Smart Board, software, etc.): |
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| 3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list): |
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G Course Evaluation and Improvement Processes

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| 1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching: 1. An evaluation sheet for the course to be filled by the students at the end of each semester. 2. Take the students' opinion about the course under consideration. 3. Discussing the course with instructors who teach the same course. |
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| 2. Other Strategies for Evaluation of Teaching by the Program/Department Instructor: 1. The level of the students in solving homework and quizzes 2. Colleagues' opinions about students' performance in this course. |
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| 3. Processes for Improvement of Teaching: 1. Encouraging students to get involved in the lecture. 2. Getting the use of tutorial classes. 3. Encouraging the students to read about the subject. |
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| 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): 1. Common Examination. 2. Team grading. |
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3. Exchanging experience by comparing results with students' results in other departments.
4. Arrange with another institution to have two common test items included on an exam and compare marks given.
5. Students who believe they are under graded can have their papers checked by a second reader.

5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement:

1. Providing reviews to develop the assigned book content.
2. Providing a discussion for the course subject by a specialized committee.
3. Comparing with similar courses in well-known universities.
4. Consulting some course specialists for course evaluation.

Faculty or Teaching Staff:

Signature: _____

Date Report Completed: 26/03/2017G

Received by: _____

Dean/Department Head

Signature: _____

Date: _____