

المركز الوطني للتقويم والاعتماد الأكاديمي

**National Center for Academic Accreditation and Evaluation**

### ATTACHMENT 5.

**T6. COURSE SPECIFICATIONS**

**(CS)**

**Math 686: Function Algebras**

**Course Specifications**

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| Institution: **King Saud University** | Date: 13-03-2019 |
| College/Department : **College of Sciences / Department of Mathematics** | |

**A. Course Identification and General Information**

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| 1. Course title and code: **Function Algebras** (**Math 686)** |
| 2. Credit hours: **3 (3+0)** |
| 3. Program(s) in which the course is offered: **PhD in Mathematics**  (If general elective available in many programs indicate this rather than list programs) |
| 4. Name of faculty member responsible for the course: **Akhlaq Ahmad Siddiqui** |
| 5. Level/year at which this course is offered: **2nd Semester of 1st year** |
| 6. Pre-requisites for this course (if any): **Math 581-1 (Functional Analysis), Math 582-1 (Complex Analysis)** |
| 7. Co-requisites for this course (if any): **Math 583-1 (Advanced Functional Analysis)** |
| 8. Location if not on main campus: **-** |
| 9. Mode of Instruction (mark all that apply):  100% %%  √  a. traditional classroom What percentage?  b. blended (traditional and online) What percentage?  c. e-learning What percentage?  d. correspondence What percentage?  f. other What percentage?  Comments: **Lectures and assignments** |

**B Objectives**

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| 1. What is the main purpose for this course?  * **Picking the students’ knowledge in functional analysis/ Banach algebras up to the level so advanced that they get ready to go for research in the area of function algebras.** * **Developing the students’ ability in self studying the mathematical literature and research papers in the area.** |

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| 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): **To get the students more involved in exploring the usage of internet for the relevant books/ journal articles available online. Keeping in view the research interests of existing many members of the faculty in modern functional analysis, we are thinking to modify the contents of the course on the lines of general Banach algebras.** |

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

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| Course Description: Definition of function algebras with examples and basic results; Silov boundary its examples and properties. Representation of carrier space; Gelfand representation theory; homomorphisms of certain function algebras into a Banach algebra. Completely regular commutative Banach algebras; the algebra C() for certain spaces ; lp-algebras; functions with absolutely convergent Fourier series; functions of class C(n); continuous functions of bounded variation; holomorphic functions of one variable; algebra of power series. |

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| 1. Topics to be Covered | | |
| List of Topics | No. of  Weeks | Contact hours |
| Motivation, definition of function algebras, examples and basic results on function algebras. | 2 | 6 |
| Definition of Silov boundary, its examples and properties. | 2 | 6 |
| Representation of carrier space, Gelfand representation theory; homomorphisms of certain function algebras into a Banach algebra | 2 | 6 |
| Completely regular commutative Banach algebras; the algebra C() for certain spaces ; lp-algebras | 4 | 12 |
| Functions with absolutely convergent Fourier series; functions of class C(n) | 2 | 6 |
| Continuous functions of bounded variation; holomorphic functions of one variable; algebra of power series | 3 | 3+3+3 |
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| 2. Course components (total contact hours and credits per semester): | | | | | | | |
|  | | Lecture | Tutorial | Laboratory/  Studio | Practical | Other: | Total |
| Contact  Hours | Planed | **45 hours** | - | - | - | **Assignments** | **45** |
| Actual |  |  |  |  |  |  |
| Credit | Planed | **3** |  |  |  | **-** | **3** |
| Actual |  |  |  |  |  |  |

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| 3. Additional private study/learning hours expected for students per week.  0- |

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| 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** | | |
|  | The student should get the knowledge about algebras of functions, Silov boundary, representation of carrier space, homomorphisms of certain function algebras into a Banach algebra, direct sum decompositions and related results, completely regular commutative Banach algebras, the algebra *C*() for certain spaces ,the *lp*-algebras, functions with absolutely convergent Fourier series, functions of class *C(n)*, continuous functions of bounded variation, holomorphic functions of one variable, algebra of power series. | **Direct delivering of knowledge in the lecture room; in question-answer/s style. The students are frequently encouraged for cross-question/s during the lectures.**  **The students are asked to write articles/ essays/ notes on carefully assigned topics; such assignments involve the use of University libraries and internet resources.**  **Referring the** (interested) **students to books/articles for further studies on the course topics.**  **Informing the students about relevant forth coming talks / seminars / conferences and advising them to attend, appropriately.**  **Students are encouraged to do group studies and also to consult the faculty for further guidance.** | **Two seminars / assignments**  **Mid-term test**  **Final examination** |
| **2.0** | **Cognitive Skills** | | |
|  | **Developing the Students’ maturity in mathematical reasoning;**  **Developing the students’ ability for self-study of the mathematical literature and research papers in the area;**  **Developing the students’ skills in utilizing the IT and internet resources;**  **Developing the student’s skills in academic communications.** | The students are asked to write articles/ essays/ notes on carefully assigned topics; such assignments involve the use of University libraries and internet resources. They are advised to make the use of IT resources and typeset their assignments by using programs such as LaTeX.  Informing the students about relevant forthcoming talks/seminars/conferences and advising them to attend, appropriately. | Carefully observing the participation of every individual student in the class in class discussions and during the lectures.  Reviewing the assignments done by the students.  Surprise tests, quizzes and other exams. |
| **3.0** | **Interpersonal Skills & Responsibility** | | |
|  | **Developing the students’ courage to know and to ask/say the right things effectively and precisely;**  **Developing the students’ skills to work in class as its team member;**  **Developing the students’ skills in academic communications.** | The students are encouraged to attend the lectures reasonably/ critically, and cross-questions during the lectures are appreciated;  Students are encouraged to do group studies and also to consult the faculty for further guidance;  The students are asked to write articles/ essays/ notes on carefully assigned topics. | Involvement of students in class activity and reviewing the assignments done by students in groups. |
| **4.0** | **Communication, Information Technology, Numerical** | | |
|  | Skills to appropriate use of computing and IT resources | The assignments given to the students involve the use of University libraries, internet resources; the students are supposed to prepare these assignments by utilizing suitable IT resources and typeset the same by using computer programs such as LaTeX. | Marking the assignments |
| **5.0** | **Psychomotor:** (N.A.) | | |
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| 5. Schedule of Assessment Tasks for Students During the Semester | | | |
|  | Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.) | Week Due | Proportion of Total Assessment |
| 1 | Mid-term test | 8th Week | 30% |
| 2 | Assignments and other homework | 11th Week | 10% |
| 3 | Class participation and quizzes | By the end | 10% |
| 4 | Final exam | By the end | 50% |
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**D. Student Academic Counseling and Support**

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| 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):  **Three office hours/ week; individual student may also seek guidance through email**. |

**E Learning Resources**

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| 1. List Required Textbooks:   * C. E. Rickart, ***Genral Theory of Banach Algebras,*** Robert E. Krieger Pb. Co., 1960. * W. Rudin, ***Functional Analysis, 2nd Ed.,*** Mcgraw-Hill, Inc., 1991. |
| 2. List Essential References Materials (Journals, Reports, etc.):   * C.D.Aliprantis and O.Burkinshaw, ***Principles of Real Analysis***, Edward Arnold, 1981. * A. Browder, ***Introduction to Function Algebras,*** W. A. Benjamin, Inc., 1969. * R. V. Kadison and J. R. Ringrose, ***Fundamental of the Theory of Operator Algebras, Volume I,*** Academic Press, 1983. * S. H. Kulkarni and B. V. Linaye, ***Real Function Algebras,*** Marcel Dekker, Inc., 1992. * W. Rudin, ***Real and Complex Analysis, 3rd Ed.,*** Mcgraw-Hill Pb. Co., Ltd., 1974. * W. Rudin, ***Priciples of Mathematical Analysis, 3rd Ed.,*** Mcgraw-Hill Book Co., 1976. * Ion Suciu, ***Function Algebras,*** Editura Academiei Republicii Socialiste Romania, 1969. * J. Wermer, ***Banach Algebras and Several Complex Variables, 2nd Ed.,*** Springer-Verlag, 1976. |
| 3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.   * Faculty websites. * More generally, search engines (Google, Yahoo, etc.) provide a lot of relevant material. |
| 4. Other learning material such as computer-based programs/CD, professional standards or regulations and software:  **-** |

**F. Facilities Required**

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| 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 maximum of 25 students in a classroom |
| 2. Technology resources (AV, data show, Smart Board, software, etc.)  Computing lab/s equipped with support programs, an efficient internet and multimedia facility. |
| 3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)  **--** |

**G Course Evaluation and Improvement Processes**

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| 1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching: Students performance in the class periods and exam results; discussions with the faculty members involved in teaching the graduate classes. |
| 2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department:  Departmental graduate committee and other discussion forums. |
| 3. Processes for Improvement of Teaching: Organizing seminars/ workshops on effective teaching and inviting model teachers; managing the class timetable and classrooms appropriately; and improving the library facilities. |
| 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)  **--** |
| 5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement: Keeping in view the research interests of many members of the faculty in modern functional analysis, we are thinking to improve the effectiveness of the course by modifying its contents on the lines of general Banach algebras. |

Name of Course Instructor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date Specification Completed: \_13-03-2019 \_

Program Coordinator: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date Received: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_