

المركز الوطني للتقويم والاعتماد الأكاديمي

**National Center for Academic Accreditation and Evaluation**

### ATTACHMENT 5.

**COURSE SPECIFICATIONS**

**Math 685**

**Harmonic analysis**

**Course Specifications**

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| Institution :King Saud University | Date: 3/11/19 |
| College/Department : | |

**A. Course Identification and General Information**

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| 1. Course title and code: Math 685 Harmonic Analysis |
| 2. Credit hours: 3( 3+0) |
| 3. Program(s) in which the course is offered. Ph.D. Mathematics  (If general elective available in many programs indicate this rather than list programs) |
| 4. Name of faculty member responsible for the course |
| 5. Level/year at which this course is offered: |
| 6. Pre-requisites for this course (if any): Math 580 |
| 7. Co-requisites for this course (if any): None |
| 8. Location if not on main campus: |
| 9. Mode of Instruction (mark all that apply):  100%%%  x  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: |

**B Objectives**

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| 1. What is the main purpose for this course?  To introduce the main concepts of harmonic analysis:  integration on locally compact spaces, Invariant functionals, Haar measure, Convolutions and group representations, Characters of locally compact groups, Characteristics and duality of locally compact groups |

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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)  **Exploring the usage of computers in the management of the course, whereby homework assignments, quizzes, tests and assessment are carried out in a dedicated website.** |

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

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| Course Description:  Elements of the theory of topological groups, Integration on locally compact spaces, Invariant functionals, Haar measure, Convolutions and group representation, Characters of locally compact groups, Characteristics and duality of locally compact groups |

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| 1. Topics to be Covered | | |
| List of Topics | No. of  Weeks | Contact hours |
| Elements of the theory of topological groups | 2 | 6 |
| Invariant functionals | 2 | 6 |
| Haar measure | 3 | 9 |
| Convolutions and group representation | 2 | 6 |
| Characters of locally compact groups. | 2 | 6 |
| Characteristics and duality of locally compact groups . | 2 | 6 |
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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 |  |  |  |  |  |
| Actual | 45 |  |  |  |  |  |
| Credit | Planed |  |  |  |  |  |  |
| Actual |  |  |  |  |  |  |

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| 3. Additional private study/learning hours expected for students per week.  5 |

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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** | | |
| 1.1 | - Elements of the theory of topological groups | **Delivering direct lectures in the class.**  **-Requiring homework assignments.**  **–Offering seminars**  **-Consulting Faculty and Tutors during office hours** | **Two seminars**  **- One mid-term exam.**  **- Final exam.** |
| 1.2 | Integration on locally compact spaces |  |  |
| 1.3 | Invariant functionals, Haar measure |  |  |
| 1.4 | Convolutions and group representation |  |  |
| 1.5 | Characters of locally compact groups |  |  |
| 1.6 | Characteristics and duality of locally compact groups. |  |  |
| **2.0** | **Cognitive Skills** | | |
| 2.1 | **The ability to ask fresh questions when the steps of the problem are sorted out** |  | **Gauging the level of participation in class discussions.** |
| 2.2 |  |  |  |
| **3.0** | **Interpersonal Skills & Responsibility** | | |
| 3.1 | **Teaching the students, by example, how to identify the features of a problem and how to focus on the mathematical tools for its resolution** | **Student participation in classroom discussions** | **class discussions.**  **Talks given by students on certain proofs or solving problems on the board.** |
| 3.2 |  |  |  |
| **4.0** | **Communication, Information Technology, Numerical** | | |
| 4.1 | **Developing the ability to browse the university library and the web for alternate sources of the material.** | **Offering assignments that require material not covered in detail in chosen textbooks.** |  |
| 4.2 |  |  |  |
| **5.0** | **Psychomotor** | | |
| 5.1 |  |  |  |
| 5.2 |  |  |  |

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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 | **First seminar** | 6th Week | **15%** |
| 2 | **Second seminar** | **11th Week** | **15%** |
| 3 | **Midterm exam** | 8th Week | **20%** |
| 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)  4 office hours each week. |

**E Learning Resources**

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| 1. List Required Textbooks    **Harmonic Analysis, Elias M. Stein 1993.** |
| 2. List Essential References Materials (Journals, Reports, etc.)  **Dieudonne’ “ Foundations of Modern analysis”** |
| 3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.  **A great deal of books in the university library and many online internet resources.**  Faculty websites.  More generally, search engines (Google, Yahoo…) provide a lot of 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 each classroom. |
| 2. Technology resources (AV, data show, Smart Board, software, etc.) |
| 3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)  **Computer labs equipped with sophisticated machines.**  **-Increasing the capacity of the internet network in order to accommodate more users.** |

**G Course Evaluation and Improvement Processes**

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| 1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching  Course evaluation by the students and discussions with them. |
| 2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department |
| 3. Processes for Improvement of Teaching  Course evaluations by the students, peers attending lectures and discussions with colleagues are helpful to improve teaching. |
| 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.  Periodical meetings with concerned peers to review teaching methods and evaluate the effectiveness of various improvement strategies. |

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

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date Specification Completed: \_\_\_\_\_\_\_\_\_\_\_\_

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

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