

المركزالوطني للتقويم والاعتماد الأكاديمي

**National Center for Academic Accreditation and Evaluation**

### ATTACHMENT 5.

**T6. COURSE SPECIFICATIONS**

**(CS)**

**Course Specifications**

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| Institution:King Saud University | Date: 28/11/2018 |
| College/Department :Science / Mathematics | |

**A. Course Identification and General Information**

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| 1. Course title and code:Numerical Analysis II (Math 651) |
| 2. Credit hours: 3 hours |
| 3. Program(s) in which the course is offered.  (If general elective available in many programs indicate this rather than list programs)  Ph.D. (Doctorate Program) of science in Mathematics |
| 4. Name of faculty member responsible for the course  Several professors of computational mathematics |
| 5. Level/year at which this course is offered:Postgraduate Students |
| 6. Pre-requisites for this course (if any):Math5501 |
| 7. Co-requisites for this course (if any):: Computer Programming through Matlab, Mathematica, and/or Maple |
| 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?  - Providing the students with a broad knowledge of mathematics particularly the in-depth knowledge of the chosen branch.  - Equipping the student with the ability to pursue independent research in an active area of mathematics.  - Meeting the requirements of higher educational institutions and research centers for highly qualified mathematicians.  - Satisfying the aspirations of a growing number of M.Sc. degree holders in mathematics to obtain a higher qualification locally.  - Promoting the quality of the department’s performance and fostering its research activities. |

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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)  - Increased use of IT or web based reference material,  - Studying and analyzing some of the recent research papers  - Changing the content as a result of new research in the field |

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

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| Course Description: |

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| 1. Topics to be Covered | | |
| List of Topics | No. of  Weeks | Contact hours |
| Floating-point arithmetic and rounding errors. | 1 | 3 |
| Direct and iteration methods of solving systems of linear equations. | 3 | 9 |
| Error estimates and convergence criteria. | 2 | 6 |
| Iterative methods for the nonlinear operator equations. | 3 | 9 |
| Fixed-point principle, Newton’s method, and Kantorovich method. | 3 | 9 |
| Quasi-Newton’s method, Quasi-Newton’s method with error terms and estimates. | 3 | 9 |
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| 2. Course components (total contact hours and credits per semester): | | | | | | | |
|  | | Lecture | Tutorial | Laboratory/  Studio | Practical | Other: | Total |
| Contact  Hours | Planed | Yes | No | Computer assignments | 2 quizzes | Homework assignments | 45 |
| Actual |  |  |  |  |  |  |
| Credit | Planed |  |  |  |  |  |  |
| Actual |  |  |  |  |  |  |

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| 3. Additional private study/learning hours expected for students per week.  10 hours for self-study and homework and computer assignments |

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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 | Learning how to deal with various simulated problems from physics, science and engineering numerically. | Lecturers, computer labs, and using the internet | Home assignments and midterm exams and quizzes, and a final exam |
| 1.2 |  |  |  |
| **2.0** | **Cognitive Skills** | | |
| 2.1 | Knowing the subject well and sharing in presenting some parts of the course | Lectures, Home assignments, specifying part of the subject to present, discussion in the lecture, and self-study, expanding some newly published papers. | Checking the home works, asking during the lecture, and exams |
| 2.2 |  |  |  |
| **3.0** | **Interpersonal Skills & Responsibility** | | |
| 3.1 | Presenting some parts of the lesson and home assignments. | Directing questions to the students and specifying an item for each to present in the lecture. | Evaluating their progress through the questions in the lecture |
| 3.2 |  |  |  |
| **4.0** | **Communication, Information Technology, Numerical** | | |
| 4.1 | Writing algorithms and solving problems | Home assignments and Programming assignments | Checking the home assignments |
| 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 | Home Assignment weekly | weekly | 10% |
| 2 | First Midterm | 7 | 20% |
| 3 | Second Midterm | 12 | 20% |
| 4 | Final Exam | 16 | 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)  10 office hours declared to the students |

**E Learning Resources**

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| 1. List Required Textbooks  -Numerical methods for nonlinear equations and optimization, by J.E. Dennis and R.B. Schnabel (1983)  -Iterative methods for linear and nonlinear equations, by C.T. Kelley (1995) |
| 2. List Essential References Materials (Journals, Reports, etc.)  Numerical Analysis by Burden and faires (1997). |
| 3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.  To be specified later by the teacher after specifying the course contents. |
| 4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.  Matlab  Mathematica  Maple |

**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.)  - Room for 20 students equipped with blackboard and projector  - T.V. with remote connection for girls section  - Providing Text books and references |
| 2. Technology resources (AV, data show, Smart Board, software, etc.)  Equipped computer lab |
| 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 should fill an evaluating form at the end of the term |
| 2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department  Re-evaluating the contents of the subject every year by the teaching professors. |
| 3. Processes for Improvement of Teaching  Encouraging the students to attend the lecture and sessions held in the department  Students should take a look at the most recent references and research work published |
| 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)  Making comparisons with other staff teacher in other university for a sample of the answer sheets |
| 5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.  Reviewing the contents of the subject on the light of the general study plane of the department |

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

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

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

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