

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: **13 / 11 / 2018** |
| College/Department : **Science / Mathematics** | |

**A. Course Identification and General Information**

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| 1. Course title and code:  **Numerical Solution of Partial Differential Equations / Math 652** |
| 2. Credit hours: **4 (3+1)** |
| 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  **Professor of Computational Mathematics** |
| 5. Level/year at which this course is offered: **First Semester / First Year** |
| 6. Pre-requisites for this course (if any):  **Math 520, Math 521, Math 522, Math 523** |
| 7. Co-requisites for this course (if any):  **Non** |
| 8. Location if not on main campus: |
| 9. Mode of Instruction (mark all that apply):  a. traditional classroom x What percentage? 80 %  b. blended (traditional and online) x What percentage? 5%  c. e-learning What percentage?  d. correspondence x What percentage? 10%  f. other x What percentage? 5%  Comments: |

**B Objectives**

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| 1. What is the main purpose for this course?  **-Gaining insight into the mathematical foundations of the various applications of Partial Differential Equations.**  **-Grasping the important notions of Analysis and numerical methods needed for a rigorous development of Physics.**  **- Reaching the frontiers of Research in the field of Partial Differential equations and their numerical solutions.** |

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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: |

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| 1. Topics to be Covered | | |
| List of Topics | No. of  Weeks | Contact hours |
| **Partial Differential Equations end Boundary value problem** | **3** | **9** |
| **Finite differential methods** | **3** | **9** |
| **Variational method and Galarkin method** | **3** | **9** |
| **Finite element methods** | **3** | **9** |
| **Some applications** | **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 | **45** | **30** |  |  |  | **75** |
| Actual |  |  |  |  |  |  |
| Credit | Planed | **3/week** | **1/week** |  |  |  | **4/week** |
| Actual |  |  |  |  |  |  |

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| 3. Additional private study/learning hours expected for students per week. 10 |

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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.) | | | | | | |
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|  | | **NQF Learning Domains**  **And Course Learning Outcomes** | | **Course Teaching**  **Strategies** | | | **Course Assessment**  **Methods** | | |
| **1.0** | | **Knowledge** | | | | | | | |
| 1.1 | | **Numerical methods to solve partial differential equations.**  **Difference method**  **Finite element method**  **Application to solve elliptic, hyperbolic and parabolic partial differential equations** | | -**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 | |  | |  | | |  | | |
| **2.0** | | **Cognitive Skills** | | | | | | | |
| 2.1 | | **-Realizing that Study of real world problems requires allowing for random effects.**  **-Realizing the need for the developed set up if we were to handle situations in which there is a presence of highly erratic perturbations.**  **-Prowess in choosing the appropriate tools to handle a modelling situation.**  **-The ability to ask fresh questions when the modelling problem is sorted out.** | | **-Requiring background reading by the students.**  **-Canvassing, through discussion, the opinions of the students on formulating suitable mathematical models for the examples covered.**  **-Discussing fresh problems raised by knowledge gained from the course**. | | | **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.** | | **- Encouraging the students to read independently and to consult books other than the chosen text books.**  **-Correcting homework assignments with full commentary on presentation.** | | | **Routine check of students’ comprehension of the course.** | | |
| 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 text books.** | | | **-Marking the assignments.**  - **Critical appraisal of seminars required from the students**. | | |
| 4.2 | |  | |  | | |  | | |
| **5.0** | | **Psychomotor** | | | | | | | |
| 5.1 | | **Not applicable** | | **Not applicable** | | | **Not applicable** | | |
| 5.2 | |  | |  | | |  | | |
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|  | | Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.) | | Week Due | Proportion of Total Assessment | | |
| 1 | | First Mid-Term Exam | | 6 |  | | |
| 2 | | Quiz 1 | | 8 |  | | |
| 3 | | Second Mid-Term Exam | | 11 |  | | |
| 4 | | Quiz 2 | | 13 |  | | |
| 5 | | Final Exam | | 16 |  | | |
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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 / week |

**E Learning Resources**

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| 1. List Required Textbooks  **1-Numerical solution of Partial Differential Equations: A. Quarteroni** |
| 2. List Essential References Materials (Journals, Reports, etc.)  **1- Distributions Theory and Partial Differential Equations: C. Zuily** |
| 3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.  **A great deal of books in the university library and many online internet resources.** |
| 4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.  Faculty websites.  More generally, search engines (Google, Yahoo…) provide a lot of material. |

**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.)  **-Computer labs equipped with sophisticated machines.**  **-Increasing the capacity of the internet network in order to accommodate more users.** |
| 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 |
| 2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department |
| 3. Processes for Improvement of 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. |

Name of Course Instructor: Nejmeddine Chorfi\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

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

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