

المركز الوطني للتقويم والاعتماد الأكاديمي

**National Center for Academic Accreditation and Evaluation**

### ATTACHMENT 5.

**T6. COURSE SPECIFICATIONS**

**(CS)**

**Math 687 (**Geometric Function Theory**)**

**Course Specifications**

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

**A. Course Identification and General Information**

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| 1. Course title and code: **687M Geometric Function Theory** |
| 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: **Nabil Ourimi, Mongi Blel, Mohammed El-Gwaiz, Fawzi Al-thukair, Houcine Guediri.** |
| 5. Level/year at which this course is offered: |
| 6. Pre-requisites for this course (if any): **585** |
| 7. Co-requisites for this course (if any): **None** |
| 8. Location if not on main campus: |
| 9. Mode of Instruction (mark all that apply):  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?  **On completion of this unit successful students will be able to:**  **Know basic concepts of complex analysis in one variable.** |

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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)  **Complex analysis is needed for advanced analysis, geometry and topology, but also has applications in differential equations, potential theory, fluid mechanics, asymptotic and wave analysis**. |

**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 |
| **Recall of definitions of holomorphic functions and Cauchy's theory** | 2 | 6 |
| **Zeros of analytic functions, Rouches theorem. The open mapping theorem. The maximum principle, Schwarz's Lemma. Caratheodory's inequality concerning the real part of an analytic function.** | 4 | 12 |
| **Conformal mappings, Reflexion Principles, Mobius transformations (a detailed study), Schwarz-Christoffel transformation, Riemann mapping theorem (without proof).** | 5 | 15 |
| **Univalent functions, Koebe's constant, a general discussion on Bieberbach's conjecture and the integral representation of univalent functions in a disc (without** **proof**). **Some special classes of functions: star-like, convex, typically real** | 4 | 12 |

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| 2. Course components (total contact hours and credits per semester): **45 Hours** | | | | | | | |
|  | | Lecture | Tutorial | Laboratory/  Studio | Practical | Other: | Total |
| Contact  Hours | Planed |  |  |  |  |  |  |
| Actual |  |  |  |  |  |  |
| Credit | Planed |  |  |  |  |  |  |
| Actual |  |  |  |  |  |  |

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

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| 4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy  **For each of the domains of learning shown below indicate:**   * **A brief summary of the knowledge or skill the course is intended to develop;** * **A description of the teaching strategies to be used in the course to develop that knowledge or skill;** * **The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.** | | | |
| **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 | * **The significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations;** * **Integrals along a path in the complex plane and understand the statement of Cauchy's Theorem;** * **Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues;** * **Use the Cauchy Residue Theorem to evaluate integrals and sum series** | **-Delivering direct lectures in the class.**  **-Requiring homework assignments.**  **-Consulting faculty during office hours.** | **-Home works.**  **-One mid-term exam.**  **-Final exam.** |
| **2.0** | Cognitive Skills | | |
| 2.1 | **Developing the basic concepts of complex analysis in one variable.** | -**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.** |
| **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 textbooks.**  **-Correcting homework assignments with full commentary on presentation.** | **Routine check of students’ comprehension of the course**. |
| **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.** | -**Marking the assignments.**  -**Critical appraisal of home works required from the students.** |
| **5.0** | **Psychomotor** | | |
| 5.1 | **Not Applicable** | **Not Applicable** | **Not Applicable** |

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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 Work** | **Along the semester** | **20%** |
| 2 | **Mid term exam** | **8th Week** | **30%** |
| 3 | **Final Exams** | **8th week** | **50%** |

**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)  **Two office hours.** |

**E Learning Resources**

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| 1. List Required Textbooks  **J.B Conway : Functions of one complex variables** |
| 2. List Essential References Materials (Journals, Reports, etc.)  **A. F. Beardon Complex Analysis, Wiley 1979**  **L.V. Ahlfors: Complex analysis McGraw-Hill. 1979**  **S. Lang, Complex Analysis, Springer , 1985** |
| 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: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

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

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