

المركز الوطني للتقويم والاعتماد الأكاديمي

**National Center for Academic Accreditation and Evaluation**

### ATTACHMENT 5.

**T6. COURSE SPECIFICATIONS**

**(CS)**

Enumerative Combinatorics

MATH 633

**1439H-2018G**

**Course Specifications**

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| Institution: King Saud University | Date: |
| College/Department : College of Sciences / Mathematics Department | |

**A. Course Identification and General Information**

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| 1. Course title and code: Enumerative Combinatorics (MATH 633) |
| 2. Credit hours: 3 |
| 3. Program(s) in which the course is offered.  (If general elective available in many programs indicate this rather than list programs)  Ph.D in Mathematics |
| 4. Name of faculty member responsible for the course  Member of Discrete Mathematics group |
| 5. Level/year at which this course is offered: In first year |
| 6. Pre-requisites for this course (if any): None |
| 7. Co-requisites for this course (if any): None |
| 8. Location if not on main campus: At Diriya, Main campus: College of Science, Building No. 4 |
| 9. Mode of Instruction (mark all that apply):  100% %%%  %ù  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?   The main purpose for this course is : General counting methods, generating functions, recurrence relations, inclusion-exclusion principle, Polaya's enumeration formula, ordered sets, Mobius inversion formula, techniques for computing Mobius functions, Mobius functions for special lattices. |

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| 1. 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)   1. Creating a Web site for the material to be available to all students at any time.  2. Home works and assignments to be marked in order to keep the students following the course. |

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

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| Course Description:  General counting methods, generating functions, recurrence relations, inclusion-exclusion principle, Polaya's enumeration formula, ordered sets, Mobius inversion formula, techniques for computing Mobius functions, Mobius functions for special lattices. |

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| 1. Topics to be Covered | | | | | | | | | |
| List of Topics | | | | | | No. of  Weeks | | Contact Hours | |
| General counting methods, | | | | | | 4 | | 12 | |
| generating functions, recurrence relations, inclusion-exclusion principle, Polaya's enumeration formula, ordered sets, | | | | | | 5 | | 15 | |
| Mobius inversion formula, techniques for computing Mobius functions, Mobius functions for special lattices. | | | | | | 5 | | 15 | |
| 2. Course components (total contact hours and credits per semester): | | | | | | | | | |
|  | | Lecture | Tutorial | Laboratory/  Studio | Practical | | Other: | | Total |
| Contact  Hours | Planed | 42 | 0 | 0 | 0 | | 0 | | 42 |
| Actual | 42 | 0 | 0 | 0 | | 0 | | 42 |
| Credit | Planed | 3 | 0 | 0 | 0 | | 0 | | 3 |
| Actual | 3 | 0 | 0 | 0 | | 0 | | 3 |

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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  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.)   |  |  |  |  | | --- | --- | --- | --- | |  | **NQF Learning Domains**  **And Course Learning Outcomes** | **Course Teaching**  **Strategies** | **Course Assessment**  **Methods** | | **1.0** | **Knowledge** | | | | 1.1 | Understanding the theory of counting. | * Contact with Lecturers through office hours. * Tutorial discussions. * Homework assignments. | * Short quizzes in tutorial classes. * Two midterm exams. * In addition to the final exam. * Evaluation of skills during   lectures and tutorials. | | **2.0** | **Cognitive Skills** | | | | 2.1 | To prepare the students to appreciate the implications of deep results in this course. Clarifying the main points of the course and linking previous knowledge to the lectures through solving problems, also identifying how useful the material in applications. | * Constructing as many examples as possible, so that the students appreciate this sophisticated course. * Directing the students to how to think in formulating mathematical models through discussions during the lectures. * Home works. | Short quizzes  Mid-Term  final exams  Class participation | | **3.0** | **Interpersonal Skills & Responsibility** | | | | 3.1 | Directing students to the way of thinking, handling the material and encouraging them to discuss any minor problems related to the material. | * The use of different sources for the material * Correcting home works and directing students to good presentation of their home work | Continuous checking to the student  skills in understanding the course.  Encouraging students to participate  in giving seminars and their  impressions on the important results. | | **4.0** | **Communication, Information Technology, Numerical** | | | | 4.1 | The use of computational tools and presentation of homework. | Encouraging students to use the different available tools in studying the course. | Giving a letter of appreciation to the distinguished students. | | **5.0** | **Psychomotor** | | | |  | Not Applicable | Not Applicable | Not Applicable | | | | |
| 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 mid term | 6 | 25% |
| 2 | Second mid term | 10 | 25% |
| 3 | Quizzes and homework | weekly | 10% |
| 4 | Final examination | end | 40% |

**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  - Enumerative Combinatorics: Richard J. Stanley Volume 1, Springer London.  - Enumerative Combinatorics: Richard J. Stanley Volume 2, Springer London. |
| 2. List Essential References Materials (Journals, Reports, etc.)  A course in Enumeration: Martin Aigner, Sptinger-Verlag Berlin Heidelberg. 2007 |
| 3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.  Web Sites dealing with Enumerative Combinatorics. |
| 1. Other learning material such as computer-based programs/CD, professional standards or regulations and software.   Multimedia associated with the textbook and the relevant websites. |

**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.)  Lecture room. |
| 2. Technology resources (AV, data show, Smart Board, software, etc.)  Not required |
| 3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)  1. The availability of the assigned books in the university bookstore.  2. The availability of references related to the course. |

**G Course Evaluation and Improvement Processes**

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| 1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching  The students are required to write a detailed report at the end of the course. |
| 2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department  1. The level of the students in solving homework and quizzes  2. Colleagues’ opinions about students’ performance in this course. |
| 3. Processes for Improvement of Teaching  1. Encouraging students to get involved in the lecture.  2. Getting the use of tutorial classes.  3. Encouraging the students to read about the subject. |
| 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)  1. Unified books.  2. Unified Examination  3. Team grading.  4. Arrange with another institution to have two unified test items included on an exam and compare marks given.  5. Students who believe they are under graded can have their papers checked by a second reader. |
| 5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.  1. Providing reviews to develop the assigned book content.  2. Providing a discussion for the course subject by a specialized committee.  3. View other math departments in well-known universities and getting help from them.  4. Consulting some course specialists for course evaluation. |

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

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

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

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