### Kingdom of Saudi Arabia

**The National Commission for Academic Accreditation & Assessment**

## Course Specification

**Course Specification**

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| Institution King Saud University, College of Science |
| College/Department Department of Chemistry |

**A Course Identification and General Information**

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| 1. Course title and code: Separation Techniques Chem 551 |
| 2. Credit hours |
| 3. Program(s) in which the course is offered.(If general elective available in many programs indicate this rather than list programs) Magister |
| 4. Name of faculty member responsible for the course  **Prof. A. Yacine Badjah Hadj Ahmed** |
| 5. Level/year at which this course is offered |
| 6. Pre-requisites for this course (if any) |
| 7. Co-requisites for this course (if any) |
| 8. Location if not on main campus |

**B Objectives**

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| 1. Summary of the main learning outcomes for students enrolled in the course.  Mastering the main theoretical and experimental aspects of modern instrumental techniques of separation: high performance liquid chromatography and gas chromatography.  Acquisition of basic knowledge about the field of applications of both chromatographic methods and the main experimental parameters which control the analysis and its efficiency |
| 2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)  This course should include more experimental hours in the laboratory to allow the students learn how to use the modern separation instruments and test them for qualitative and quantitative of standard and real samples. |

**C. Course Description** (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

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| 1 Topics to be Covered | | |
| List of Topics | No of  Weeks | Contacthours |
| Classification of chromatographic techniques, main interactions phenomena, fundamental equations, retention parameters, column efficiency, optimization of the separation | **2** | **4** |
| High performance liquid chromatography: normal and reversed phase modes, importance of polarity, isocratic and gradient elution modes, mobile phase specifications, description of the instrument, main detectors | **2** | **4** |
| Gas chromatography: field of application, isothermal and temperature programmed modes, packed and capillary columns, main detectors | **2** | **4** |
| Qualitative applications: use of retention indices for identification of unknown components  Quantitative applications: external and internal standard methods | **1** | **2** |
| Hyphenated techniques: use of mass spectrometry hyphenated to GC and LC instruments | **1** | **2** |
| Solving theoretical and practical problems | **2** | **4** |
| Hyphenated techniques: use of mass spectrometry hyphenated to GC and LC instruments | **1** | **2** |
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| Experimental applications: optimisation of separation based on main chromatographic parameters, identification and quantitation of unknown constituents in a real sample | **2** | **4** |
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| 2 Course components (total contact hours per semester): | | | | |
| Lecture: **18** | Tutorial: **4** | Laboratory **4** | Practical/Field work/Internship | Other: |

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| 3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week) |

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| 4. Development of Learning Outcomes in Domains of Learning  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. |
| **a. Knowledge** |
| (i) Description of the knowledge to be acquired  Fundamentals theoretical and experimental aspects of chromatographic separation  Classification of chromatographic techniques |
| (ii) Teaching strategies to be used to develop that knowledge  Theoretical lectures, solving problems, laboratory demonstration on the instruments, field training on analysis of real samples |
| (iii) Methods of assessment of knowledge acquired  Students testing through solving various theoretical and practical problems |
| **b. Cognitive Skills** |
| (i) Description of cognitive skills to be developed  Training students to use modern chromatographic instruments  Optimisation of experimental parameters  Discussion and interpretation of experimental results |
| (ii) Teaching strategies to be used to develop these cognitive skills |
| (iii) Methods of assessment of students cognitive skills |
| **c. Interpersonal Skills and Responsibility** |
| (i) Description of the interpersonal skills and capacity to carry responsibility to be developed |
| (ii) Teaching strategies to be used to develop these skills and abilities |
| (iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility |
| **d. Communication, Information Technology and Numerical Skills** |
| (i) Description of the skills to be developed in this domain.  Determination of main analytical parameters to calculate retention parameters, column efficiency, concentrations of constituents |
| (ii) Teaching strategies to be used to develop these skills |
| (iii) Methods of assessment of students numerical and communication skills |
| **e. Psychomotor Skills (if applicable)** |
| (i) Description of the psychomotor skills to be developed and the level of performance required |
| (ii) Teaching strategies to be used to develop these skills |
| (iii) Methods of assessment of students psychomotor skills |

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| 5. Schedule of Assessment Tasks for Students During the Semester | | | |
| Assessment | Assessment task (eg. essay, test, group project, examination etc.) | Week due | Proportion of Final Assessment |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
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**D. Student Support**

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| 1. Arrangements for availability of teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week) |

##### E Learning Resources

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| 1. Required Text(s) |
| 2. Essential References |
| 3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) |
| 4-.Electronic Materials, Web Sites etc |
| 5- Other learning material such as computer-based programs/CD, professional standards/regulations |

**F. Facilities Required**

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| Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.) |
| 1. Accommodation (Lecture rooms, laboratories, etc.) |
| 2. Computing resources |
| 3. Other resources (specify --eg. 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 (eg. 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. |