**UNIVERSITY OF SARGODHA**

**DEPARTMENT OF CHEMISTRY**

**COURSE OUTLINE Spring 2020**

Course Tittle: Chromatographic Techniques-I

Course Code: CHEM-703

Credit Hours: 03

Instructor: Prof. Dr. Farooq Anwar

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DESCRIPTION& OBJECTIVES

This course is designed to impart and enhance the learning and technical know-how / knowledge of MSc (Hons.) Food Science and Technology students so as to enabling them to apply different advanced chromatographic techniques for separation as well as qualitative and quantitative analysis of plant food components/ingredients, different food samples and food products (beverages, cereals, vegetable oils, bakery and dairy products). In addition to focusing on basics of chromatography, important advanced techniques such as High Performance Liquid Chromatography, (HPLC), Gas Chromatography-Mass spectrometry (GC/MS) and Supercritical Fluid Chromatography (SCFC) will be covered. Comprehensive details about introduction, principal, instrumentation and applications of each of the above chromatographic techniques will be discussed. Knowledge about recent developments and the trouble shooting in these chromatographic techniques will also be covered.

READINGSEADINGS

**Recommended Books**

1. [Salvatore Fanali](https://www.amazon.com/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Salvatore+Fanali&text=Salvatore+Fanali&sort=relevancerank&search-alias=books), [Paul R. Haddad](https://www.amazon.com/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Paul+R.+Haddad&text=Paul+R.+Haddad&sort=relevancerank&search-alias=books) , [Colin Poole](https://www.amazon.com/s/ref%3Ddp_byline_sr_book_3?ie=UTF8&field-author=Colin+Poole&text=Colin+Poole&sort=relevancerank&search-alias=books), [David K. Lloyd](https://www.amazon.com/s/ref%3Ddp_byline_sr_book_4?ie=UTF8&field-author=David+K.+Lloyd&text=David+K.+Lloyd&sort=relevancerank&search-alias=books). Liquid Chromatography: Fundamentals and Instrumentation (Handbooks in Separation Science) 1st Edition, Elsevier; (2013)
2. Diane C Turner, Mathias Schäfer, Steven Lancaster, Imran Janmohamed, Anthony Gachanja, Jason Creasey

 , Gas Chromatography–Mass Spectrometry, RSC Publishers, London (2019)

1. Christian, G.D. Analytical Chemistry, 7th edition John Wiley & Sons, NY (2013).
2. Robards, K., Haddad, P.R. and Jackson, P.E. Principles and Practice of Modern Chromatographic Methods,

Elsevier Academic Press, London (2004)

1. Harris, D.C. Quantitative Chemical Analysis, 9th edition Freeman, NY (2015).
2. Nikalje, Anna. . A Handbook of Chromatography, Scholar's Press Verlag Omniscriptam, Deutschland, Germany (2017)
3. [Larry M. Miller](https://onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Miller%2C+Larry+M), [J. David Pinkston](https://onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Pinkston%2C+J+David), [Larry T. Taylor](https://onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Taylor%2C+Larry+T). Modern Supercritical Fluid Chromatography: Carbon Dioxide Containing Mobile Phases, John Wiley & Sons, Inc. (2019)

COURSE CONTENTS

CONTENTS

Introduction, theory, instrumentation and Applications of High Performance Liquid Chromatography, Gas Chromatography-Mass spectrometry and Supercritical Fluid Chromatography.

COURSE SCHEDULECOURSE SCHEDULE

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| --- | --- | --- |
| **Week** | **Topics and Readings\*** | **Dates** |
| 1 | Introduction and Basics of Chromatographic Techniques | March 2-6, 2020  |
| 2 | Historical Developments and Classification of Chromatography | March 9-13, 2020 |
| 3 | Introduction, theory and principle of Gas Chromatography | March 16-20, 2020 |
| 4 | Instrumentation of Gas Chromatography | March 23-27, 2020 |
| 5 | Principle and Instrumentation of Gas Chromatography-Mass Spectrometry (GC-MS) | March 30 to April 3, 2020 |
| 6 | Applications of GC and GC-MS in Different Areas | April 6-10, 2020 |
| 7 | Introduction to Liquid Chromatography and High Performance Liquid Chromatography (HPLC) | April 13-17, 2020 |
| 8 | Theory and Principle and Over view of Instrumentation of HPLC  | April 20-24, 2020 |
| 9 | **MID TERM EXAM** | April 27-May 1, 2020 |
| 10 | Instrumentation of HPLC; details of different parts, isocratic and gradient elution | May 4-8, 2020 |
| 11 | Instrumentation of HPLC including details of different parts and nature of stationary and mobile phases, detectors, data integration etc., | May 11-15, 2020 |
| 12 | Applications of High Performance Liquid Chromatography | May 18-22, 2020 |
| 13 | Introduction to Supercritical Fluids and Supercritical Fluid Chromatography (SCFC) | May 25-29, 2020 |
| 14 | Theory of SCFC | June 1-5, 2002 |
| 15 | Instrumentation of SCFC | June 8-12, 2020 |
| 16 | Applications of SCFC | June 15-19, 2020 |
| 17 | **Final Term Exam** | June 22-26, 2020 |
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|  | **\*** For readings PPT slides are provided, books are also enlisted herewith, related some journal articles will also be provided.  |   |

RESEA RESEARCH PROJECT/ASSIGNMENTCH ASSIGNEMENT

The students will be given chromatography related assignments and they will prepare slides for presentation for training purposes.

ASSESSMENT CRITERIA RITERIA

Mid Term Exam: 30%

Sessional: 20%

Final exam: 50%

RUL RULES AND REGULATIONSES AND REGULATIONS

1. Minimum attendance 75% is necessary to appear in exam.
2. mobiles to be off/silent during class time and no permission of using mobile in exam
3. as per university academic policy