

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI**

**Course Schedule: June - November 2024**

**Department** : BOTANY/CHEMISTRY  
**Name/s of the Faculty** : Dr. Janet Sabina X/Dr.H.Shakila\*  
**Course Title** : Bioanalytical Techniques  
**Course Code** : 19ID/IC/BA55  
**Shift** : I

<b>Week &amp; No. of hours</b>	<b>Units &amp; Topics</b>	<b>Teaching Methodology</b>	<b>Text &amp; References</b>	<b>Method of Evaluation</b>
Jun 19 – 26, 2024 (Day Order 1 - 6) 3*	<b>*UNIT:1 Microscopy: Principle, Construction</b> 1.1 Light microscopes – Compound, Phase Contrast <b>Unit 5 Spectroscopic Techniques and Spectrochemical Methods</b> 5.1 Introduction to Spectroscopy, Beer Lambert’s law-statement and deviation;	Lecture, PPT and video presentations Students given hands on experience with the microscopes	Steven, E Ruzin, Plant <i>Microtechnique and Microscopy</i> , USA: Oxford University, 1999. Skoog, D.A, West, D.M. <i>Fundamentals of Analytical Chemistry</i> . Thomson Asia, 2014. Vogel, A.I. <i>Vogel's Textbook of Quantitative Chemical Analysis</i> . Prentice Hall, Science, 2000.	Group Discussion
Jun 27 – July 4, 2024 (Day Order 1 - 6) 3*	* 1.1 Differential Interference Contrast and Confocal Microscopes. 1.2 Preparation of Specimen for Light Microscopy  5.1 UV- Visible-instrumentation and applications-estimation of Mn <sup>2+</sup>	Lecture, PPT and video presentations Students given hands on training for specimen preparation with light microscopy	Wilson, K, Walker,J, <i>Principles And Techniques of Biochemistry and Molecular Biology</i> . 6 <sup>th</sup> edition Cambridge University Press, 2007 Skoog, D.A, West, D.M. <i>Fundamentals of Analytical Chemistry</i> . Thomson Asia, 2014. Vogel, A.I. <i>Vogel's Textbook of Quantitative Chemical Analysis</i> . Prentice Hall, Science, 2000.	<b>MCQ test on Microscopy (10 Marks)</b>

July 5 – 12, 2024 (Day Order 1 - 6) 3*	*1.2 Paraffin Techniques – Fixatives: FAA, Carnoy's, Dehydration and Infiltration, Embedding and Sectioning (Paraffin Blocks), Staining and Mounting 1.3 Electron Microscopes – TEM, specimen preparation for TEM.  5.2 Nephelometry and Turbidimetry Principle, Instrumentation and Applications- determination of TDS of water sample	Lecture through chalk and blackboard and video presentations Students given hands on training for specimen preparation using paraffin blocks with light microscopy	Srivastava, T.N & P.C.Kamboj. <i>Systematic Analytical Chemistry</i> . New Delhi: Shobanlal Nagin Chand, 1999 Skoog, D.A, West, D.M. <i>Fundamentals of Analytical Chemistry</i> . Thomson Asia, 2014. Vogel, A.I. Vogel's <i>Textbook of Quantitative Chemical Analysis</i> . Prentice Hall, Science, 2000.	<b>Assignment on general topics (10 Marks)</b>
July 15 – 23, 2024 (Day Order 1 - 6) 3*	<b>UNIT 2 Centrifugation: Principle, Instrumentation and Application</b> 2.1 Bench, Ultracentrifuge  5.3 Principle, Instrumentation and Applications of Flame photometry (estimation of K/Na)	Lecture through chalk and black board and practical exposure	Wilson, K, Walker,J, <i>Principles And Techniques of Biochemistry and Molecular Biology</i> . 6 <sup>th</sup> edition Cambridge University Press, 2007	<b>MCQ test on unit 5 Other Component (15 Marks)</b>
July 24 – 31, 2024 (Day Order 1 - 6) 3*	*2.1 Refrigerated, Continuous flow centrifuge and Microfuge.  5.3 Principle, Instrumentation and Applications of Fluorimetry (estimation of Fluorescein)	Lecture through chalk and blackboard and practical exposure	Skoog, D.A, West,D.M. <i>Fundamentals of Analytical Chemistry</i> . Thomson Asia, 2014.	Quiz
Aug 1 – 5, 2024 (Day Order 1 - 3)	Revision			
Aug 6 – 10, 2024	<b>C.A. Test – I</b>			

Aug 12 – 14, 2024 (Day Order 4-6)	2.2 Density gradient centrifugation	Lecture through chalk and blackboard and practical exposure	Skoog, D.A, West, D.M. <i>Fundamentals of Analytical Chemistry</i> . Thomson Asia, 2014.	Group Discussion
Aug 16 – 23, 2024 (Day Order 1-6) 3*	*2.2 Differential centrifugation  <b>Unit 4 Purification techniques</b> 4.1 Desiccants: Types, efficiency, regeneration and choice of desiccants	Lecture through chalk and blackboard and practical exposure	Gopalan, R, Subramanian, P.S and Rengarajan, K. <i>Elements of Analytical Chemistry</i> . New Delhi: Sultan Chand, 2004. Skoog, D.A, West, D.M. <i>Fundamentals of Analytical Chemistry</i> . Thomson Asia, 2014. Vogel, A.I. Vogel's <i>Textbook of Quantitative Chemical Analysis</i> . Prentice Hall, Science, 2000.	Quiz
Aug 27 – Sep 3, 2024 (Day Order 1-6) 3*	*2.3 Isolation of Chloroplast (Practical)  4.2 Technique of drying of solids, Distillation: Types, Theory and techniques of fractional, Steam and Vacuum distillation	Lecture through PPT and video presentations Practical exposure	Wilson, K, Walker, J, <i>Principles And Techniques of Biochemistry and Molecular Biology</i> . 6 <sup>th</sup> edition Cambridge University Press, 2007  Skoog, D.A, West, D.M. <i>Fundamentals of Analytical Chemistry</i> . Thomson Asia, 2014. Vogel, A.I. Vogel's <i>Textbook of Quantitative Chemical Analysis</i> . Prentice Hall, Science, 2000.	Worksheet

Sep 4 – 11, 2024 (Day Order 1-6) 3*  3	<b>*Unit 3 - Separation Techniques:</b> 3.2 Capillary Electrophoresis (Capillary Zone and Capillary Gel)  4.3 Recrystallisation, Sublimation - Types, techniques and applications	Lecture through, PPT and video presentations	James P. Landers, <i>Handbook of Capillary and Microchip Electrophoresis and Associated Microtechniques</i> , USA: CRC, 2008. Skoog, D.A, West, D.M. <i>Fundamentals of Analytical Chemistry</i> . Thomson Asia, 2014. Vogel, A.I. <i>Vogel's Textbook of Quantitative Chemical Analysis</i> . Prentice Hall, Science, 2000.	<b>MCQ test on Unit 3 Other Component (15 Marks)</b>
Sep 12 - 20, 2024 (Day Order 1- 6) 3*  3	*3.2 Gel Electrophoresis – Agarose and Polyacrylamide, Orthogonal-Field-Alternation, Gel Electrophoresis (OFAGE)  4.4 Criteria and test for purity- melting point, boiling point and density	Lecture through chalk and blackboard and practical exposure	Separation of DNA by <i>Capillary Electrophoresis</i> by Herb Schwartz and Andras Guttman.	Group Discussion
Sep 23 - 26, 2024 (Day Order 1-4) 2*  3	*3.2 Field Inversion Gel Electrophoresis (FIGE)  <b>Unit 3 Separation Techniques</b> 3.1 Separation by solvent extraction: Principle, Extraction by chemically active solvents, Soxhlet extraction, Factors Influencing the Extraction Efficiency.	Lecture through, PPT and video presentations	James P. Landers, <i>Handbook of Capillary and Microchip Electrophoresis and Associated Microtechniques</i> , USA: CRC, 2008.  Skoog, D.A, West, D.M. <i>Fundamentals of Analytical Chemistry</i> . Thomson Asia, 2014.  Vogel, A.I. <i>Vogel's Textbook of Quantitative Chemical Analysis</i> . Prentice Hall, Science, 2000. Prentice Hall, Science, 2000.	Conceptual questions test
Sep 27 – Oct 3, 2024	<b>C.A. Test – II</b>			
Oct 4 – 5, 2024	*3.2	Lecture through,	Landers, James P.	Conceptual

<p>(Day 5 &amp; 6)</p> <p>*2</p>	<p>Immuno-electrophoresis</p> <p>3.4 Separation by Precipitation, methods of Filtering, Drying-Ignition &amp; Incineration of Precipitate,</p>	<p>PPT and video presentations</p>	<p><i>Handbook of Capillary Electrophoresis.</i> USA: CRC, 1996.</p> <p>Skoog, D.A, West, D.M. <i>Fundamentals of Analytical Chemistry.</i> Thomson Asia, 2014.</p> <p>Vogel, A.I. <i>Vogel's Textbook of Quantitative Chemical Analysis.</i> Prentice Hall, Science, 2000.</p>	<p>questions test</p>
<p>Oct 7 - 15, 2024 (Day Order 1 to 6)</p> <p>3*</p> <p>3</p>	<p>*3.3 Separation of Proteins/ DNA using Gel Electrophoresis (Practical)</p> <p>3.4 Nucleation, Crystal Growth, Solubility Product</p>	<p>Lecture through PPT and video Presentations Practical exposure</p>	<p>Wilson, K, Walker,J, <i>Principles And Techniques of Biochemistry and Molecular Biology.</i> 6th edition Cambridge University Press, 2007</p> <p>Skoog, D.A, West, D.M. <i>Fundamentals of Analytical Chemistry.</i> Thomson Asia, 2014.</p> <p>Vogel, A.I. <i>Vogel's Textbook of Quantitative Chemical Analysis.</i> Prentice Hall, Science, 2000.</p>	<p>Group Discussion</p>

<p>Oct 16 - 22, 2024 (Day Order 1 to 6) 3*</p> <p>3</p>	<p>*3.3 Separation of Proteins/ DNA using Gel Electrophoresis (Practical)</p> <p>3.4 Solubility Product, Principle, Factors affecting solubility, Purity of Precipitates, Co-precipitation and Post Precipitation</p>	<p>Lecture through PPT and practical demonstration</p>	<p>Wilson, K, Walker,J, <i>Principles And Techniques of Biochemistry and Molecular Biology</i>. 6th edition Cambridge University Press, 2007</p> <p>Skoog, D.A, West, D.M. <i>Fundamentals of Analytical Chemistry</i>.</p>	<p>Numerical on solubility product</p>
<p>Oct 23 - 24, 2024 (Day Order 1 to 2)</p>	<p><b>REVISION</b></p>			