

LASERs

**Arab Academy for Science and Technology and Maritime Transport  
Computer Science Curriculum  
Course Syllabus**

<b>Course Code:</b> BA301	<b>Course Title:</b> Advanced Statistics	<b>Classification:</b> <b>R</b>	<b>Coordinator's Name:</b> Dr. Nahla Belal	<b>Credit Hours:</b> 3
<b>Pre-requisites:</b> <ul style="list-style-type: none"><li>BA203 (Probability and Statistics)</li></ul>	<b>Co-requisites:</b> None	<b>Schedule:</b> Lecture: 2 hours Tutorial-Lab: 2 hours		
<b>Course Description:</b> <p>This course will help students gain an understanding of elementary probability theory and how to apply it to analyze statistical problems. It also provides an undergraduate student who is preparing for graduate study in statistical concepts to include measurements of location and dispersion, probability, probability distributions, sampling, estimation, hypothesis testing, regression, and correlation analysis.</p>				
<b>Textbook:</b> <p>Michael J. Crawley, <i>Statistics: An Introduction using R</i>, Wiley.</p>				
<b>References:</b> <ul style="list-style-type: none"><li>Peter Dalgaard, <i>Introductory Statistics with R</i>, Springer.</li><li>Andy Field, Jeremy Miles, and Zoe Field, <i>Discovering Statistics using R</i>, SAGE Publications.</li></ul>				

<b>Course Objective/Course Learning Outcome:</b>	<b>Contribution to Program Student Outcomes:</b>
<ol style="list-style-type: none"> <li>1. Understand the basic concepts of probability, random variables, probability distribution, and joint probability distribution.</li> <li>2. Compute point estimation of parameters, explain sampling distributions, and understand the central limit theorem.</li> <li>3. Construct confidence intervals on parameters.</li> <li>4. Compute and interpret simple linear regression between two variables.</li> </ol>	<p>(SO1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.</p> <p>(SO3) Communicate effectively in a variety of professional contexts.</p>
<ol style="list-style-type: none"> <li>1. Use statistical methodology and tools in the problem solving process.</li> <li>2. Compute and interpret descriptive statistics using numerical and graphical techniques.</li> <li>3. Set up a least squares fit of data to a model.</li> <li>4. Use null hypothesis significance testing to test the significance of results.</li> <li>5. Use specific significance tests including T-test (one and two sample), Wilcoxon signed-rank test (one and two sample).</li> <li>6. Use software and simulation to do statistics (R).</li> </ol>	<p>(SO2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.</p> <p>(SO6) Apply computer science theory and software development fundamentals to produce computing-based solutions.</p>

<p><b>Course Outline:</b></p> <ol style="list-style-type: none"> <li>1. Sampling and probability (Random sampling- Probability calculations and combinatory)Discrete event simulation</li> <li>2. Distributions (Discrete- Continuous)</li> <li>3. Statistics and graphical display for single data (Histograms- Q-Q plots- Boxplots)</li> <li>4. Statistics and graphical display for grouped data (Histograms- boxplots- Stripcharts)</li> <li>5. Generating tables and Marginal tables and relative frequency</li> </ol>	<ol style="list-style-type: none"> <li>6. Graphical display for Tables (Barplots- Dotcharts- Piecharts)</li> <li>7. Correlation (Pearson –Spearman)</li> <li>8. Simple linear regression</li> <li>9. Residuals and fitted values</li> <li>10. Prediction and confidence bands</li> <li>11. Comparison of variances</li> <li>12. One-sample T- test</li> <li>13. Two-sample T-test</li> <li>14. Wilcoxon signed-rank test</li> <li>15. Paired sample test (T-test, Wilcoxon test)</li> </ol>
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