**Course Syllabus**

**First Semester, 2025-2026**

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| **Program: BET-CpET** | | | |
| **Course / Course Code: Engineering Data Analysis / MATHT13** | | | |
| **Unit(s): 3** | | | |
| **Course Description:**  This course covers fundamental concepts of probability and statistics with a strong emphasis on applications in Computer Technology (IT). Students will learn how to analyze data, apply probability theories, conduct statistical tests, and utilize statistical programming tools for IT-related decision-making. Topics include descriptive and inferential statistics, regression analysis, hypothesis testing, data visualization, and introductory data analytics. | | | |
| **Course Learning Outcomes:**  By the end of this course, students should be able to:  1. Explain key concepts in probability and statistics and their relevance in computer technology.  2. Apply statistical methods to analyze data sets and extract meaningful insights.  3. Utilize probability distributions and statistical tests for decision-making.  4. Implement statistical models using Excel.  5. Develop data-driven solutions to real-world computer technology problems | | | |
| **Course Content and Schedule:** | | | |
| **Week** | **Topic** | **Learning Activity** | **Assessment** |
| 1 | Course description, learning outcomes, content and schedule. Class basics: expectations, conduct of class period, grading system, and requirements. | * PowerPoint presentation * Discussion * Show suggested topics for StatPaper   *\* Groupings for Statistical Paper* | Quiz on class basics |
| 2-3 | 1. Introductory Concepts  1.1. Importance of Probability and Statistics  to Computer Technology students  1.2 Two Types of Statistics  1.3. Basic Statistical Terms  1.4. Data gathering methods | * PowerPoint presentation * Recitation * Self-tests * Data classification and Identification of types of data from an actual IT data set * Show how to write research questions   *\* Submission of Topic/Title for StatPaper* | Quiz on introductory concepts  Hands-on exercise on data representation |
| 4-5 | 2. Descriptive statistics  2.1. Measures of central tendency  2.2. Measures of variability  2.3. Measures of shape    3. Data Visualization  3.1. Table  3.2. Graph | * Interactive lecture * Self-tests * Generation of summary statistics and of tables and graphs using Excel * Examination and validation of Computer from actual tables and graphs * Show how to write null and alternative hypotheses   *\* Submission of Research Questions* | Problem set  Mini project: Analyzing a data set from IT applications  Quiz on descriptive statistics |
| 6 | **EXAM #1** | *Coverage: Topics 1-3* |  |
| 7-8 | 4. Probability Theory and Distributions  4.1. Basic probability concepts and rules  4.2. Conditional probability and Bayes’ Theorem  4.3. Discrete probability distribution  4.3.1. Binomial  4.3.2. Poisson  4.4. Continuous probability distribution  4.4.1. Normal  4.4.2. Exponential | * PowerPoint presentation * Pair-compare-ask * Self-tests * Research on real-life articles that contain summary statistics * Show how to write a survey questionnaire in print or Google form   \* *Submission of Hypotheses* | Problem set: Probability problems related to cybersecurity and IT decision-making  Quiz: Practical problem solving |
| 9-10 | 5. Sampling and Estimation  5.1. Sampling techniques and errors  5.2. Central Limit Theorem  5.3. Confidence intervals and estimation | * Guided discussion * Self-tests * Identification of bias in actual data collected * Conducting a survey and analyzing sampling distributions * Show how to code and collate data from print survey or Google form   \* *Submission of Survey Questionnaire* | Quiz on data analysis |
| 11 | **EXAM #2** | *Coverage: Topics 4-5* |  |
| 12-13 | 6. Hypothesis Testing  6.1. Formulation of hypothesis  6.2. p-value, significance level, Type I & II errors  6.3. t-tests, chi-square test, ANOVA | * PowerPoint presentation * Jigsaw activity: Steps in hypothesis testing * Scenario analysis * Hands-on activity on using Excel in statistical hypothesis testing   *\* Fielding out of Survey Questionnaire* | Testing hypothesis using real IT data  Case study: Test randomly picked hypothesis |
| 14-15 | 7. Correlation and Regression Analysis  7.1. Pearson and Spearman correlation  7.2. Simple and multiple linear regression  7.3. Applications in IT  7.3.1. Predictive analytics  7.3.2. Decision support | * PowerPoint presentation * Think-pair-share on a pair of correlated variables * Regression analysis on IT data such as predicting website traffic   \* *Submission of Survey Results in Excel* | Mini project: Predictive modeling  Quiz on correlation |
| 16 | **EXAM #3** | *Coverage: Topics 6-7* |  |
| 17 | 8. Introduction to Data Analytics and Machine  Learning Applications  8.1. Role of statistics in machine learning and  artificial intelligence  8.2. Supervised and unsupervised learning  8.3. Introduction to clustering and classification  9. Statistical Process Control & Quality Assurance  9.1. Control charts and process improvement  9.2. IT system performance monitoring | * Guest lecturer from an industry expert on data analytics   \* *Finalization of Part 1 of StatPaper*   * Problem-based learning activity: Analyzing system logs and performance metrics * Exploratory Data Analysis using Excel   *\* Finalization of Part 2 of StatPaper* | Report on statistical process control techniques in IT |
| 18 | Submission of StatPaper | *\* Individual question-and-answer on StatPaper per group.* |  |

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| **Grading System** | **A. *Components Percentage***   * + Attendance 10%   + Activities (Recitation, Exercises, and Quizzes) 30%   + Performance Tasks 20%   + Examinations 30%   + Attitude (Self-rated) 10%   **B. Computation of Grades in Percentage**  Grade *=* | |
| **Course References** | * Arnold, Kane, M, & Lewis. (2019). A computational approach to statistical learning, CRC Press. * Baron, M. (2013). Probability and statistics for computer scientists (2nd ed.). CRC Press. Retrieved from https://www.amazon.com * Blay. (2013). Elementary statistics. Anvil publishing. * Devore, J. L. (2015). Probability and Statistics for Engineering and the Sciences. * Evans, M. J., & Rosenthal, J. S. (2010). Probability and statistics: The science of uncertainty (2nd ed.). W. H. Freeman. Retrieved from https://utstat.toronto.edu * Gonzales & Nocon. (2015). Essential statistics. MaxCor publishing house inc. * Kasmin, F., & Asmai, S. A. (Eds.). (2016). Probability and statistics for Computer technology. Retrieved from https://books.google.com * Mathai, A. & Haubold H. (2018). Probability and statistics: A course for physicists and engineers. De Gruyter. Boston. * Myatt. (2007). Making sense of data: A practical guide to exploratory data analysis and data mining. Wiley & Sons. * Pishro-Nik, H. (2014). Probability, statistics, and random processes. Retrieved from https://www.probabilitycourse.com * Trivedi, K. S. (2001). Probability and statistics with reliability, queueing, and computer science applications (2nd ed.). Wiley. Retrieved from https://www.amazon.com | |
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