

**ST 210: Spring 2010**  
**Topics covered for Final Exam**  
**(M. Mulekar)**

Chapter 1:

- Statistics
- Population, sample
- Univariate, bivariate, multivariate data
- Categorical data, numerical data
- Discrete and continuous variables

- Spread
- Shape
- Other unusual characteristics such as gaps and outliers
- Displaying bivariate data
  - Time series plot
  - Describing relations and trends

Appendix A:

- Surveys,
- Census and sample surveys
- Experiment
- Sampling
  - Selection error
  - Non-response error
  - Response error
  - Voluntary response error
- Sampling methods
  - Non-random and Random sampling
  - Convenience sampling
  - Judgmental sampling
  - Systematic sampling
  - Stratified sampling
  - Proportional sampling
- Observational studies and experiments
- Drawing conclusions from statistical studies

Chapter 2:

- Frequency distribution
  - Frequency
  - Relative frequency
  - Percentage
  - Cumulative frequency
- Displaying categorical data
  - Frequency distribution tables
  - Bar charts
  - Pie charts
- Displaying numerical data
  - Frequency distribution table
  - Stem-and-leaf leaf
  - Dotplot
  - Histogram
  - Frequency Polygon
  - Cumulative frequency plot
- Describing distribution using
  - Center

Chapter 3:

- Measures of center
  - Mean
  - Median
  - Mode
- Measures of spread
  - Range
  - Variance/Standard deviation
  - Inter-quartile range
- Quartiles and percentiles
- Displaying numerical data using Boxplots
- Chebyshev's and Empirical rules
- Z-scores

Chapter 4:

- Chance experiment
- Sample space and an event
- Venn diagram and tree diagram
- Complement, Union and Intersection
- Probability of an event
- Properties of probability
- Conditional probability
- Mutually exclusive and Independent events
- Addition rule and Multiplication rule

Chapter 5:

- Random variable
- Discrete versus continuous
- Discrete probability distribution
- Properties of discrete probability distribution
- Cumulative distribution function
- Mean or expected value
- Variance and standard deviation
- Binomial distribution

Chapter 6:

- Random variable

- Discrete versus continuous
- Continuous probability distribution
- Density function and density curve
- Probability and area under the curve
- Cumulative distribution function
- Normal distribution
  - Mean and standard deviation
  - Standard normal curve
  - Standardized value, Z-score
  - Inverse normal and  $Z_\alpha$

#### Chapter 7:

- Parameter versus statistic
- Sampling variability
- Sampling distributions
- Approximating sampling distribution with simulation
- The sampling distribution of a sample mean
- Central limit theorem
- Standard error

**60% of the exam will be based on the chapters 8, 9 10, and 13.**

#### Chapter 8:

- Estimation process, estimator, and estimate
- Point estimation versus interval estimation
- Point estimate
- Confidence interval
- Confidence level
- Margin of error or bound on error
- Student's t distribution
- Confidence interval for proportion
- Confidence interval for mean
- Interpreting confidence interval
- Interpreting confidence level
- Effect of sample size, level of significance, and standard deviation on the length of the interval
- Choosing the sample size.

#### Chapter 9:

- Testing of hypothesis
- Null hypothesis
- Alternative hypothesis
- Level of significance
- Type I and Type II errors and their consequences

- Rejection & non-rejection regions
- Observed significance level or p-value
- Interpreting p-value
- Test for population proportion
- Test for population mean

#### Chapter 10:

- Comparing two population means (independent samples and known variances cases)
  - Hypothesis test
  - Confidence interval
- Comparing two population means (independent samples and unknown variances case)
  - Hypothesis test
  - Confidence interval
- Paired t-test (dependent samples)
  - Hypothesis test
  - Confidence interval
- Comparing two population proportions (Large and independent samples case)
  - Hypothesis test
  - Confidence interval

#### Chapter 13:

- Linear correlation
- Scatterplots
- Correlation coefficient
- Simple linear regression
- Slope of line
- Y-intercept
- Prediction equation
- Predicted value
- Random error
- Standard deviation of random error
- Using the regression model
- Coefficient of determination
- Inference about slope