

## Detailed ASIBS Short Course 7-week Online Curriculum

Learning Objective	Topics covered	Key Take Home Acquired Skills
<b>Week 1: Introduction to Statistics and Study Design</b>		
Statistical key concepts of data collection and analysis	Population, sample, variable, parameter and statistic	Random sampling as a good representation of the population. Difference between parameter and statistic.
Sampling techniques	Cross-sectional, prospective, retrospective, and randomized study designs	Optimal study designs for rare diseases and rare exposures. Longitudinal vs. cross-sectional designs.
Validity and generalizability	Measures of internal and external validity	Understanding the major threats to internal and external validity.
Descriptive statistics	Measures of central tendency and dispersion	Most appropriate measures of central tendency and dispersion when dealing with symmetric/skewed distribution.
<b>Week 2: Probability</b>		
Introduction to basic probability : Part One	Joint, marginal and conditional probabilities. Rules of probability	Difference between independence and mutual exclusivity.
Probability tools and distributions	Random variables, the normal distribution, the t distribution and the binomial distribution	Relationship between the t and the normal distribution. The normal approximation of the binomial distribution.
Precision of an estimate	Sampling distribution, standard error, critical values, confidence intervals	Difference between standard deviation and standard error. Correct interpretation of a confidence interval.
Hypothesis testing	Null and Alternative hypotheses, type I and type II errors, power, sample size	Difference between the type I and the type II error. Interpretation of the p-value. Strategies to increase statistical power.
<b>Week 3: One-sample and Two-sample Inference with Continuous and Categorical Variables</b>		
Hypothesis testing for continuous data	The z test, the Students' t-test for one sample, two samples or paired data	Appropriate selection between the t test and the z test. Appropriate test with correlated samples.
Hypothesis testing for categorical data	One and two sample(s) test for proportions.	Appropriate test when dealing with proportions.
<b>Week 4: Correlation and Simple Linear Regression</b>		
Linear correlation	The Pearson's correlation coefficient	Correct interpretation of the correlation coefficient. Difference between causality and association.
Simple linear regression	The regression line, the Least Square Estimates of the regression coefficients, the ANOVA table, hypothesis testing on regression line	Meaning of the regression line. Interpretation of the slope and the intercept.
Goodness of fit of a regression model	Analysis of residuals, model diagnostics, goodness of fit test, outliers	Assessing the goodness of fit of a regression model.
<b>Week 5: Confounding, Effect Modification, and Multiple Linear Regression</b>		
Confounding and effect modification	Definition of a confounder and an effect modifier. Implication for model building	Consequences of unmeasured confounding and effect modification in regression analysis.
Building an appropriate multiple regression model	The multiple regression model, model building, main effects, interaction terms, independent predictors	Variable selection and interpretation in multiple regression models.
Model diagnostics for multiple linear models	Analysis of residuals, collinearity, goodness of fit and choice of the optimal model	Assessing the validity of a regression model.
<b>Week 6: Categorical Data Analysis</b>		
Introduction to basic probability : Part Two	Contingency tables. Rules of probability. Illustration with sensitivity and specificity	Understanding the influence of the prevalence of a disease on sensitivity and specificity.
Measures of association	The odds ratio, risk ratio, risk difference, and confidence intervals	Identification of appropriate measure of association across different sampling schemes.

Categorical data analysis	The Chi-square test, the Fisher's exact test, McNemar's test, Cochran-Armitage test for trend	Correctly use Fisher's exact test and the Chi-square test. Appropriate tests for matched samples.
<b>Week 7: Logistic Regression</b>		
Building and interpreting a logistic regression model	The logit link function, features of a simple and multiple logistic model, the Wald test, interpretation of the regression parameters	Models for dichotomous outcomes. Interpret correctly the regression parameters and derive odds ratios.
Model diagnostics for logistic models	The likelihood ratio test, the c-statistic	Assessing the validity of the logistic regression model.