

## What Is ANCOVA?

Analysis of covariance is the regression between a continuous response (or Y variable) and a combination of continuous and categorical predictors (or X variables). As in ANOVA models, interactions might or might not be present in an ANCOVA model. In an ANCOVA model, the continuous predictor is usually called a covariate. The categorical predictors are usually referred to as classification, class, or grouping variables. Covariance is a measure of the extent to which two variables vary jointly, and it measures the strength of that relationship.

An ANCOVA model integrates ANOVA with regression by combining the following: a regression of the response versus the continuous predictor (or predictors) while holding the categorical predictors constant, and an ANOVA comparison of the mean response values for different categories or groups of the categorical variable while holding the continuous predictors constant. By integrating ANOVA and regression, ANCOVA provides a more discriminating analysis that can determine the true effects of the variables. For example, ANCOVA could be used to model the continuous response **Weight** as a function of the continuous predictor **Age** and the categorical predictor **Gender**. Here, **Gender** has two levels (Male and Female).

When you hear "analysis of covariance," you might wonder whether covariance in ANCOVA has the same role as variance in ANOVA. The answer is "no." It is true that in both ANOVA and ANCOVA the F test is used for hypothesis testing. The F statistic is the ratio of two variances: the variance between groups divided by the variance within groups. Remember that this calculation is the same as the mean square for model (or MSM) divided by the mean square for error (or MSE). However, in analysis of covariance, the relationship of the response variable to the covariate (that is, the continuous predictor variable) is quantified and used to increase power.