

MBS 504: Generalized Linear Models

| Module 1: Linear Models & Exponential Family of Distributions | |
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| No | Topic |
| 1 | <ul style="list-style-type: none">• Introduction to linear models. |
| 2 | <ul style="list-style-type: none">• Exponential family of distributions;<ul style="list-style-type: none">➤ Binomial,➤ Poisson,➤ Normal, <p>distributions as a member of exponential family of distributions and hence deriving their mean and variance.</p> |
| 3 | <ul style="list-style-type: none">• Exponential family of distributions;<ul style="list-style-type: none">➤ Multinomial➤ Exponential <p>distributions as a member of exponential family of distributions and hence deriving their mean and variance.</p> |

Module 4: Logistic Regression Model

| No | Topic |
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| 1 | <ul style="list-style-type: none">• Introduction to generalized linear models (GLM);<ul style="list-style-type: none">➤ components of GLM: (systematic, random)➤ link functions (Canonical and non-canonical). |
| 2 | <ul style="list-style-type: none">• Different link function used in GLM :<ul style="list-style-type: none">➤ log link➤ logit link➤ identity link➤ probit. |
| 3 | <ul style="list-style-type: none">• Inference for GLMs :<ul style="list-style-type: none">➤ score,➤ Wald and➤ deviance statisticsfor testing goodness of fit of generalized linear model. |

| No | Topic |
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| 4 | <ul style="list-style-type: none"> • Dummy variables and its uses in MLR • Interaction between two qualitative variables • Interaction between qualitative and quantitative covariates |
| 5 | <ul style="list-style-type: none"> • Need for logistic regression; <ul style="list-style-type: none"> ➤ Model, ➤ Assumptions; ➤ Dichotomous, polytomous and continuous predictor variables. |
| 6 | <ul style="list-style-type: none"> • Fitting Logistic regression models; <ul style="list-style-type: none"> ➤ Interpretation of Regression Coefficients. |
| 7 | <ul style="list-style-type: none"> • Inferences concerning regression coefficients: <ul style="list-style-type: none"> ➤ Confidence intervals for regression coefficients, ➤ Significance test of regression coefficients. ➤ Hosmer Lemshow test |
| 8 | <ul style="list-style-type: none"> • Area under the ROC curve to assess goodness of fit of logistic model. |
| 9 | <ul style="list-style-type: none"> • Interaction and confounding effects. • Estimating odds ratios in presence of interaction |

Module 5: Model Adequacy and Conditional Logistic Regression

| No | Topic |
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| 1 | <ul style="list-style-type: none">• Model building – selection of subset models, forward and backward methods (linear & logistic). |
| 2 | <ul style="list-style-type: none">• Concept of Autocorrelation and Heteroscedasticity |
| 3 | <ul style="list-style-type: none">• Generalized least square estimators (GLSE) |
| 4 | <ul style="list-style-type: none">• Conditional logistic regression for matched case control studies |