# Analysis of Longitudinal Data with Practical Applications

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The aim of the course is to provide an overview of statistical models for analyzing longitudinal data. Particular attention will be placed to explore a real longitudinal data set and to distinguish between so-called age and cohort effects. Topic of the course include linear mixed effect models, generalized linear mixed effect models, and handling missing data. The approaches discussed during the course will be implemented using the R software.

**Main topics of the course:**

* Introduction to the design of longitudinal data
* Model definition, random effect covariance structure, estimation and inference
* Missing data mechanism, sensitivity analyses

**Software:**

R (https://cran.r-project.org/) and its interface [RStudio](http://www.rstudio.com/), with packages lme4, nlme, ggplot2

**References:**

P Diggle, P Heagerty, K-Y Liang, S Zeger. *Analysis of Longitudinal Data*, Oxford:

Oxford University Press, 2002

[GM Fitzmaurice](https://www.google.it/search?hl=it&tbo=p&tbm=bks&q=inauthor:%22Garrett+M.+Fitzmaurice%22), [NM Laird](https://www.google.it/search?hl=it&tbo=p&tbm=bks&q=inauthor:%22Nan+M.+Laird%22), [JH Ware](https://www.google.it/search?hl=it&tbo=p&tbm=bks&q=inauthor:%22James+H.+Ware%22)**.** *Applied Longitudinal Ana*lysis, Wiley-Interscience, New Jersey, 2004

RJA Little, DB Rubin. 2002. *Statistical Analysis with Missing Data.* New York: Wiley. 2nd ed., 2002