

Introduction to Multi-level Models

Contents

1	Introduction to multi-level models for correlated data	1
---	--	---

1 Introduction to multi-level models for correlated data

For more, see:

- David Rocke¹'s materials from the 2021 edition of this course²
 - May 25 - June 1 lectures
- Other UC Davis courses:
 - EVE 225³: “Linear Mixed Modeling in Ecology & Evolution”
 - * usually taught every other winter or spring by Kate Laskowski⁴
 - * materials, including syllabus and lecture videos: <https://laskowskilab.faculty.ucdavis.edu/teaching-2/>
 - STA/BST 224⁵: “Analysis of Longitudinal Data”
 - * usually taught every spring by Shuai Chen⁶
 - * should be accessible after completing Epi 204
 - EPI 226⁷: “Methods for Longitudinal & Repeated Measurement Data”
 - * usually taught by Heejung Bang⁸
 - PSC 205D⁹: “Multilevel Models”
 - PSC 205G¹⁰: “Applied Longitudinal Data Analysis”
 - STA 101¹¹: “Advanced Applied Statistics for the Biological Sciences”
 - STA 207¹²: “Statistical Methods for Research II”
 - STA 232B¹³: “Applied Statistics II”
 - * usually taught every winter by Jiming Jiang¹⁴
 - PLS 207¹⁵: “Applied Statistical Modeling for the Environmental Sciences”
 - EDU 236¹⁶: “Application of Hierarchical Linear Models in Education Research”
 - HDE 205¹⁷: “Longitudinal Data Analysis”
- Books:
 - Dobson and Barnett (2018) Chapter 11¹⁸

¹<https://dmrocke.ucdavis.edu/>

²<https://dmrocke.ucdavis.edu/Class/EPI204-Spring-2021/EPI204-Spring-2021.html>

³<https://catalog.ucdavis.edu/search/?q=EVE+225>

⁴<https://eve.ucdavis.edu/people/kate-laskowski>

⁵<https://catalog.ucdavis.edu/search/?P=BST%20224>

⁶<https://shuaichen.weebly.com/>

⁷<https://catalog.ucdavis.edu/search/?P=EPI+226>

⁸<https://biostat.ucdavis.edu/people/heejung-bang>

⁹<https://catalog.ucdavis.edu/search/?q=PSC+205D>

¹⁰<https://catalog.ucdavis.edu/search/?q=PSC+205G>

¹¹<https://catalog.ucdavis.edu/search/?q=STA+101>

¹²<https://catalog.ucdavis.edu/search/?q=STA+207>

¹³<https://www.stat.ucdavis.edu/~jiang/sta232b.html>

¹⁴<https://www.stat.ucdavis.edu/~jiang/>

¹⁵<https://catalog.ucdavis.edu/search/?q=PLS+207>

¹⁶<https://catalog.ucdavis.edu/search/?q=EDU+236>

¹⁷<https://catalog.ucdavis.edu/search/?q=HDE+205>

¹⁸<https://www.taylorfrancis.com/chapters/mono/10.1201/9781315182780-11/clustered-longitudinal-data-annette-dobson-adrian-barnett?context=ubx&refId=95f6c50e-093a-4488-a042-92a9f151a4b5>

- Vittinghoff et al. (2012) Chapter 7¹⁹
- Gelman and Hill (2007)
- Jiang and Nguyen (2021)
 - * by UC Davis Statistics Professor and GGE faculty member Jiming Jiang²⁰
- Faraway (2016)
- McCulloch, Searle, and Neuhaus (2008)
- Hedeker and Gibbons (2006)
- Wakefield (2013)
- Zuur (2009)
- Diggle et al. (2013)
- Fitzmaurice, Laird, and Ware (2012)
- Fitzmaurice et al. (2009)
- Gałeczki and Burzykowski (2013)
- Congdon (2020)
- Molenberghs and Verbeke (2005)
- Verbeke and Molenberghs (2000)
- Jewell and Hubbard (2016)
 - * by UC Berkeley professors

- Congdon, Peter D. 2020. *Bayesian Hierarchical Models: With Applications Using R, Second Edition*. 2nd edition. Milton: CRC Press.
- Diggle, Peter, Scott Zeger, Patrick Heagerty, and Kung-Yee Liang. 2013. *Analysis of Longitudinal Data*. Second edition. Vol. 25. Oxford Statistical Science Series. United Kingdom: Oxford University Press.
- Dobson, Annette J, and Adrian G Barnett. 2018. *An Introduction to Generalized Linear Models*. 4th ed. CRC press. <https://doi.org/10.1201/9781315182780>.
- Faraway, Julian J. 2016. *Extending the Linear Model with r: Generalized Linear, Mixed Effects and Nonparametric Regression Models*. 2nd ed. Chapman; Hall/CRC. <https://doi.org/10.1201/9781315382722>.
- Fitzmaurice, Garrett M, Marie Davidian, Geert Verbeke, and Geert Molenberghs. 2009. *Longitudinal Data Analysis*. Chapman & Hall/CRC Handbooks of Modern Statistical Methods. Boca Raton: CRC Press. <https://doi.org/10.1201/9781420011579>.
- Fitzmaurice, Garrett M, Nan M Laird, and James H Ware. 2012. *Applied Longitudinal Analysis*. 2nd ed. Vol. 998. Wiley Series in Probability and Statistics. Chichester: Wiley. <https://doi.org/10.1002/9781119513469>.
- Gałeczki, Andrzej T., and Tomasz. Burzykowski. 2013. *Linear Mixed-Effects Models Using R : A Step-by-Step Approach*. Springer Texts in Statistics. New York, NY: Springer. <https://doi.org/10.1007/978-1-4614-3900-4>.
- Gelman, Andrew, and Jennifer Hill. 2007. *Data Analysis Using Regression and Multilevel/Hierarchical Models*. Analytical Methods for Social Research. Cambridge, MA: Cambridge University Press.
- Hedeker, Donald R., and Robert D. Gibbons. 2006. *Longitudinal Data Analysis*. Wiley Series in Probability and Statistics. Hoboken, N.J: Wiley-Interscience.
- Jewell, Nicholas P, and Alan E Hubbard. 2016. *Analysis of Longitudinal Studies in Epidemiology*. Chapman & Hall/CRC Texts in Statistical Science. Taylor & Francis. <https://books.google.com/books?id=-LoLPQAACAAJ>.
- Jiang, Jiming, and Thuan Nguyen. 2021. *Linear and Generalized Linear Mixed Models and Their Applications*. Second edition. Springer Series in Statistics. New York, NY: Springer. <https://doi.org/10.1007/978-1-0716-1282-8>.
- McCulloch, Charles E, Searle Shayle R, and John M Neuhaus. 2008. *Generalized, Linear, and Mixed Models*. 2nd ed. Vol. 651. John Wiley & Sons.
- Molenberghs, Geert., and Geert. Verbeke. 2005. *Models for Discrete Longitudinal Data*. Springer Series in Statistics. New York: Springer Science+Business Media, Inc. <https://doi.org/10.1007/0-387-28980-1>.
- Verbeke, Geert, and Geert Molenberghs. 2000. *Linear Mixed Models for Longitudinal Data*. 1st ed. Springer Series in Statistics. New York, NY: SpringerLink (Online service); Springer.

¹⁹https://link.springer.com/chapter/10.1007/978-1-4614-1353-0_7

²⁰<https://www.stat.ucdavis.edu/~jiang/>

- <https://doi.org/10.1007/978-1-4419-0300-6>.
- Vittinghoff, Eric, David V Glidden, Stephen C Shiboski, and Charles E McCulloch. 2012. *Regression Methods in Biostatistics: Linear, Logistic, Survival, and Repeated Measures Models*. 2nd ed. Springer. <https://doi.org/10.1007/978-1-4614-1353-0>.
- Wakefield, Jon. 2013. *Bayesian and Frequentist Regression Methods*. 1st ed. 2013. Springer Series in Statistics. New York, NY: Springer New York.
- Zuur, Alain F. 2009. *Mixed Effects Models and Extensions in Ecology with r*. Statistics for Biology and Health. New York ; Springer.