



Workshop Introduction

STAT2014/6014

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Video for today

<https://www.youtube.com/watch?v=yBPraaPfLSA>

Introduction

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Consultation (Week 6, 7-12): Wednesday,
2-3 pm CBE room 3.07, or by appointment



Plan For Today

- Workshop Introduction
- Workshops
 - Week 6 Slides: GLM Introduction
 - Week 7 Slides: Binary regression (modelling)
- Exercises (self-study):
 - GLM Exercise for Week6

STAT2014/6014 is...

- **STAT2008/6038 (Linear Regression)**
 - Week 1 ~ Week 6: Simple Linear Regression
 - Week 7 ~ Week 12: Multiple Linear Regression and relevant concepts
- **Generalized Linear Model (GLM) workshop (from Week 6)**
 - Week 6 Slides: GLM Theory, Exponential family, Maximum Likelihood Estimator (MLE)
 - Week 7 Slides: Binary regression
 - Week 8 Slides: Binomial regression
 - Week 9 Slides: Poisson regression
 - Week 10 Slides: Model Diagnostics for Binomial and Poisson Regression
 - Week 11 Slides: Gamma regression
 - Week 12: Revision

STAT2014/6014 – 3 components:

- STAT2008's **lectures**
 - Lectures from Week 1
 - Deliver by [Abhinav](#)
 - Mainly linear regression (LR)
- STAT2014/6014's **tutorials**
 - The same as STAT2008's tutorial, from Week 2 (LR)
 - Deliver by [your tutor](#)
- STAT2014/6014's **workshops**
 - Workshops from Week 6
 - Deliver by [Lucy](#)
 - Mainly generalized linear model (GLM)
 - [Assignment 2](#) (mostly LR and some GLM)
 - [Final Exam](#) (50% LR and 50% GLM)

Wattle page

- › [STAT2014/6014 Workshop - Information](#)
- › [STAT2014/6014 Workshop - \(0\) Announcements](#)
- › [STAT2014/6014 Workshop - \(1\) Tutorial Codes and Slides
\(from PREVIOUS semesters\)](#)
- › [STAT2014/6014 Workshop - \(2\) Workshop Slides](#)
- › [STAT2014/6014 Workshop - \(3\) R Datasets and Script Files
\(Workshop examples\)](#)
- › [STAT2014/6014 Workshop - \(4\) Workshop GLM Exercise](#)

In addition to the workshop...

- **Tutorial notes for linear regression topics from past years**
 - Tutorial notes that I prepared for the **previous** semesters (optional)
 - Tutorial contents from the previous year are **different** from this semester's tutorial but happy for you to use them as references
- **Q&As:** FAQs via emails weekly (optional)
- **Weekly GLM exercises:** Textbook and past exam examples
- **Selected practice/past exam questions** (Week11)
- **Non-examinable workshops** (Week 12)

Workshop Timetable

Week	STAT2014/6014 Workshop (1st hour)	STAT2014/6014 Workshop (2nd hour)	Relevant GLM Exercise
Week 6	Week 6 Slides: GLM introduction	Week 7 Slides: Binary regression (Modelling)	GLM Exercise for Week 6 (EFD, MLE, Binary Regression)
Week 7	GLM Exercise for Week 7 - Hypothesis (MLR) (Annotation - see Week 7 Binary regression slides)	GLM Exercise for Week 7 - Hypothesis (GLM) (Annotation - see Week 7 Binary regression slides)	GLM Exercise for Week 7 (MLR vs GLM)
Week 8	Week 7 Slides: Binary regression (Hypothesis)	Week 8 Slides: Binomial regression Week 9 Part I Slides: Poisson regression	GLM Exercise for Week 8 (T1)
Week 9	Week 9 Part II Slides: Goodness of fit	Week 10 Slides: Goodness of fit	GLM Exercise for Week 9 (T3)
Week 10	Week 11 Slides: Gamma regression	GLM Exercise for Week 8 - T1 GLM Exercise for Week 9 - T3 GLM Exercise for Week 10 - T2 GLM Exercise for Week 11 - T3	GLM Exercise for Week 10 (T2) GLM Exercise for Week 11 (T3)
Week 11	Week 12 Slides: GLM Revision	Selected Past Exam Revision Workshop	-
Week 12	Non-Examinable Workshop	Non-Examinable Workshop	-

*Note that the slides' week/topic number may not necessarily be the same as the workshop's week number. Please refer to the workshop timetable above to have a one-to-one mapping.

Textbooks

- **The Statistical Sleuth – a course in Methods of Data Analysis (3rd edition)**
 - Ramsey/Schafer
 - Relevant chapters: Chapter 20.1-20.4, 21.1-21.4 and 22.1-22.4
 - Available from the Hancock Library.
- **Extending the linear model with R**
 - Julian J. Faraway
 - Relevant chapters: The first three chapters
 - Available from the Hancock Library.
- Please note that both textbooks are **optional**. If you are not confident with our workshop discussions, you may use the textbook(s) to improve your understanding.
- Both textbooks' relevant chapters might have advanced discussions on GLM (e.g. the GLM residual diagnostics, extra-binomial variation). For this course, you **don't expect to understand** those advanced topics at all (since this is an entry-level course for GLM).

Notations you may see in hand-written notes:

- dsb = distribution
- \perp = idp= independent
- fun = function
- ctn = continue
- LHS = left-hand side
- RHS = right-hand side
- obs = observation
- pr = probability
- w.r.t = with respect to
- Hypo = hypothesis
- ND = normally distributed
- RV = random variable
- Expo = exponential
- w.r.t = with respect to
- ...

Hand-written notes will be available after the weekly workshop.

GLM – example 1 (self-study)

- I want to apply for an internship...
 - Outcome: get an offer/not get an offer \Rightarrow 0/1 (binary)
 - Drivers: education background, interview performance etc.
- For the model
 - Response Y (given X s): Whether I will get the offer or not
 - No longer normally distributed
 - Binary variable (i.e., Bernoulli distribution)
 - Covariates (X s): Education, interview performance etc.
 - **GLM model**