BIOL 3295, Winter 2023

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Contents

Chapter 1

About

This is a *sample* book written in **Markdown**. You can use anything that Pandoc's Markdown supports; for example, a math equation $a^2 + b^2 = c^2$.

1.1 Usage

Each **bookdown** chapter is an .Rmd file, and each .Rmd file can contain one (and only one) chapter. A chapter *must* start with a first-level heading: `# A good chapter`, and can contain one (and only one) first-level heading.

Use second-level and higher headings within chapters like: `## A short section` or `### An even shorter section`.

The `index.Rmd` file is required, and is also your first book chapter. It will be the homepage when you render the book.

1.2 Render book

You can render the HTML version of this example book without changing anything:

1. Find the **Build** pane in the RStudio IDE, and
2. Click on **Build Book**, then select your output format, or select "All formats" if you'd like to use multiple formats from the same book source files.

Or build the book from the R console:

```
bookdown::render_book()
```

To render this example to PDF as a `bookdown::pdf_book`, you'll need to install XeLaTeX. You are recommended to install TinyTeX (which includes XeLaTeX): https://yihui.org/tinytex/.

1.3 Preview book

As you work, you may start a local server to live preview this HTML book. This preview will update as you edit the book when you save individual .Rmd files. You can start the server in a work session by using the RStudio add-in "Preview book", or from the R console:

```
bookdown::serve_book()
```

Chapter 2

Schedule

- Thurs Jan 5: Introduction
- Fri Jan 6: Population biology with discrete and continuous variables
- Tues Jan 10: Introduction to Rmarkdown and tidyverse **Assignment 1 is assigned**
- Thurs Jan 12: Geometric growth
- Fri Jan 13: Geometric growth
- Tues Jan 17: Numerical solutions and graphing population data **Assignment 1 is due & Assignment 2 is assigned**
- Thurs Jan 19: Exponential growth
- Fri Jan 20: Exponential growth
- Tues Jan 24: Density dependence and logistic growth **Assignement 2 is due**
- Thurs Jan 26: Density dependence and logistic growth
- Fri Jan 27: Density dependence and logistic growth
- Tues Jan 31: Discrete time density dependence
- Thurs Feb 2: **EXAM I**
- Fri Feb 3: Age-structured models
- Tues Feb 7: Stage-structured models
- Thurs Feb 9: Stage-structured models
- Fri Feb 10: Stage-structured models
- Tues Feb 14: Numerical analysis of stage-structured models **Assignment 3 is assigned**
- Thurs Feb 16: Density dependence in stage-structured models
- Fri Feb 17: Metapopulation models WINTER BREAK
- Tues Feb 28: Continuous space models **Assignment 3 is due**
- Thurs Mar 2: Spatially explicit models in population biology
- Fri Mar 3: Population dynamics in a warming world
- Tues Mar 7: Spatially explicit population dynamics in a warming world
- Thurs Mar 9: Disease dynamics

- Fri Mar 10: The net reproduction number
- Tues Mar 14: Overview of models in population biology
- Thurs Mar 16: **EXAM II**
- Fri Mar 17: What is evolutionary ecology?
- Tues Mar 21: Haploid selection model
- Thur Mar 23: Selection coefficients for COVID-19 variants
- Fri Mar 24: Estimating selection coefficients **Assignment 4 is assigned**
- Tues Mar 28: The evolutionary ecology of pathogens
- Thurs Mar 30: The evolutionary ecology of COVID-19
- Fri Mar 31: The evolutionary ecology of hosts **Assignment 4 is due**
- Tues Apr 3: The evolution of reproductive effort in plants
- Thurs Apr 5: Evolutionarily stable and convergent stable strategies
- Fri Apr 6: Review

Chapter 3

Blocks

3.1 Equations

Here is an equation.

$$f(k) = \binom{n}{k} p^k (1-p)^{n-k} \tag{3.1}$$

You may refer to using `\@ref(eq:binom)`, like see Equation (3.1).

3.2 Theorems and proofs

Labeled theorems can be referenced in text using `\@ref(thm:tri)`, for example, check out this smart theorem 3.1.

Theorem 3.1. *For a right triangle, if c denotes the* length *of the hypotenuse and a and b denote the lengths of the* ***other*** *two sides, we have*

$$a^2 + b^2 = c^2$$

Read more here https://bookdown.org/yihui/bookdown/markdown-extensions-by-bookdown.html.

3.3 Callout blocks

The R Markdown Cookbook provides more help on how to use custom blocks to design your own callouts: https://bookdown.org/yihui/rmarkdown-cookbook/custom-blocks.html

Chapter 4

Footnotes and citations

4.1 Footnotes

Footnotes are put inside the square brackets after a caret `^[]`. Like this one [1].

4.2 Citations

Reference items in your bibliography file(s) using `@key`.

For example, we are using the **bookdown** package [Xie, 2022] (check out the last code chunk in index.Rmd to see how this citation key was added) in this sample book, which was built on top of R Markdown and **knitr** [Xie, 2015] (this citation was added manually in an external file book.bib). Note that the `.bib` files need to be listed in the index.Rmd with the YAML `bibliography` key.

The RStudio Visual Markdown Editor can also make it easier to insert citations: https://rstudio.github.io/visual-markdown-editing/#/citations

[1] This is a footnote.

Chapter 5

Parts

You can add parts to organize one or more book chapters together. Parts can be inserted at the top of an .Rmd file, before the first-level chapter heading in that same file.

Add a numbered part: `# (PART) Act one {-}` (followed by `# A chapter`)

Add an unnumbered part: `# (PART\*) Act one {-}` (followed by `# A chapter`)

Add an appendix as a special kind of un-numbered part: `# (APPENDIX) Other stuff {-}` (followed by `# A chapter`). Chapters in an appendix are prepended with letters instead of numbers.

Chapter 6

Sharing your book

6.1 Publishing

HTML books can be published online, see: https://bookdown.org/yihui/bookdown/publishing.html

6.2 404 pages

By default, users will be directed to a 404 page if they try to access a webpage that cannot be found. If you'd like to customize your 404 page instead of using the default, you may add either a `_404.Rmd` or `_404.md` file to your project root and use code and/or Markdown syntax.

6.3 Metadata for sharing

Bookdown HTML books will provide HTML metadata for social sharing on platforms like Twitter, Facebook, and LinkedIn, using information you provide in the `index.Rmd` YAML. To setup, set the `url` for your book and the path to your `cover-image` file. Your book's `title` and `description` are also used.

This `gitbook` uses the same social sharing data across all chapters in your book- all links shared will look the same.

Specify your book's source repository on GitHub using the `edit` key under the configuration options in the `_output.yml` file, which allows users to suggest an edit by linking to a chapter's source file.

Read more about the features of this output format here:

https://pkgs.rstudio.com/bookdown/reference/gitbook.html

Or use:

```
?bookdown::gitbook
```

Bibliography

Yihui Xie. *Dynamic Documents with R and knitr*. Chapman and Hall/CRC, Boca Raton, Florida, 2nd edition, 2015. URL http://yihui.org/knitr/. ISBN 978-1498716963.

Yihui Xie. *bookdown: Authoring Books and Technical Documents with R Markdown*, 2022. URL https://CRAN.R-project.org/package=bookdown. R package version 0.30.