**ANTH 6413**

**ANALYTICAL METHODS IN HUMAN EVOLUTIONARY STUDIES**

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| Instructor: W. Andrew Barr  Email: [wabarr@gmail.com](mailto:wabarr@gmail.com)  Office: SEH 6685  Office Hours: Tues, 12PM – 2PM or by appt. | FALL 2016  Class Time: Wednesday 9:00-10:50 AM  Location: SEH 6845  Website: hompal-stats.wabarr.com |

**COURSE DESCRIPTION**

This course provides a survey of analytical methods in human evolutionary studies, with an emphasis on practical implementation. Topics to be covered include descriptive statistics, regression and related techniques, ANOVA and related techniques, analysis of categorical data, multivariate statistics, phylogenetic comparative methods, and randomization approaches.

**LEARNING OBJECTIVES**

This course is meant to provide a practical introduction to statistical methods in human evolutionary studies. After completing this course, you should be able to:

* Understand enough statistical theory to critically evaluate the use of methods reported in the published literature.
* Have enough practical experience to choose appropriate statistical analyses and implement them on your own data sets.
* Use R – the emerging standard software for statistical analysis.

**COURSE MECHANICS**

The course meets once per week. Each meeting will consist of a short lecture and demonstration, followed by exercises that focus on practical implementation. Readings will be assigned each week and should be completed before the class period for which they are assigned. **This course requires the use of a laptop with a working installation of the RStudio software. Please contact instructor BEFORE THE FIRST CLASS MEETING if this is a problem so that alternative arrangements can be made.**

There are two required texts for this course and one that is recommended:

Gotelli NJ. 2012. A Primer of Ecological Statistics, Second Edition. Sunderland, Massachusetts:

Sinauer Associates, Inc.

Manly BFJ. 2004. Multivariate Statistical Methods: A Primer, Third Edition. Chapman and Hall.

**Recommended**: Dalgaard P. 2004. Introductory Statistics with R. New York: Springer.

**EVALUATION**

Your grade will be calculated based on two practical exams, homework assignments, and one class project. For this project, you will analyze a real dataset (either your own, or one drawn from published data) to address a specific research hypothesis. For the presentation, you will be walking the class through the process of analyzing your data (including the R code used to make all visuals and to perform all statistical analysis). Your presentation should take approximately 25 minutes. You will submit an R Markdown document (.Rmd) detailing your analysis for grading. If you have any concerns about your grade on a particular assignment, please contact the instructor as soon as possible, rather than waiting until the end of the semester.

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| Practical Exam I | 20% |
| Practical Exam II | 20% |
| Combined Homework | 40% |
| Class Project & Presentation | 20% |

**ACADEMIC INTEGRITY**

You are responsible for upholding the GW Code of Academic Integrity. Please review the code here <http://studentconduct.gwu.edu/code-academic-integrity>. You are expected to do your own work. Class presentations and exams must be the sole work of the student. Collaboration is allowed on homework assignments, but copying the answers or R code from another person constitutes cheating, and will be dealt with by reporting the violation to the Office of Academic Integrity.

**ATTENDANCE POLICIES**

You should attend every class session unless you have a legitimate excused absence. Late work will only be accepted, and make-up exams will only be offered, if there is a valid (*e.g.*, medical, religious) justification. See below for a summary of the university policy on religious holidays:

1. Students should notify instructors during the first week of the semester of their intention to be absent from class on their day(s) of religious observance;
2. Instructors should extend to these students the courtesy of absence without penalty on such occasions, including permission to make up examinations
3. Instructors who intend to observe a religious holiday should arrange at the beginning of the semester to reschedule missed classes or to make other provisions for their course-related activities

**COURSE SCHEDULE**

See full course website at http://hompal-stats.wabarr.com/homework.html

| **Date** | **Demo** | **Homework** | **Reading** |
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| August 29 | [Intro to Course](http://hompal-stats.wabarr.com/presentations/intro2course/intro2course.html) & [Intro to R](http://hompal-stats.wabarr.com/presentations/intro2R/intro2R.html) | [Try R Tutorial](http://tryr.codeschool.com/) | - |
| September 5 | **Labor Day, No Class** | - | [R Markdown Cheat Sheet](http://hompal-stats.wabarr.com/readings_pdf/rmarkdown-cheatsheet.pdf) |
| September 12 | [Visualizing Data](http://hompal-stats.wabarr.com/presentations/visualization/visualization.html) & [Programming & Wrangling](http://hompal-stats.wabarr.com/presentations/programming-wrangling/programming-wrangling.html) | [Homework #1](http://hompal-stats.wabarr.com/homework_assignment_1.html) - [Solution](http://hompal-stats.wabarr.com/HW_1_solution.html) | [dplyr vignette](http://cran.rstudio.com/web/packages/dplyr/vignettes/introduction.html) |
| September 19 | [lapply()](http://hompal-stats.wabarr.com/presentations/lapply/lapply.html) - [Probability](http://hompal-stats.wabarr.com/presentations/probability/probability.html) - [Summary Stats](http://hompal-stats.wabarr.com/presentations/summary_stats/summary_stats.html) - [Distributions](http://hompal-stats.wabarr.com/presentations/distributions/distributions.html) | [Homework #2](http://hompal-stats.wabarr.com/homework_assignment_2.html) - [Solution](http://hompal-stats.wabarr.com/HW_2_solution.html) | Gotelli: Ch 1 - 3 |
| September 26 | [Hypothesis Testing](http://hompal-stats.wabarr.com/presentations/hypothesis_testing/hypothesis_testing.html) | [Homework #3](http://hompal-stats.wabarr.com/homework_assignment_3.html) - [Solution](http://hompal-stats.wabarr.com/HW_3_solution.html) | [Blog post](https://oikosjournal.wordpress.com/2011/10/11/frequentist-vs-bayesian-statistics-resources-to-help-you-choose/); [Youtube Video](https://youtu.be/42QuXLucH3Q); Gotelli: Ch 4 - 5 |
| October 3 | [Correlation and Regression](http://hompal-stats.wabarr.com/presentations/regression/regression.html) | [Homework #4](http://hompal-stats.wabarr.com/homework_assignment_4.html) - [Solution](http://hompal-stats.wabarr.com/HW_4_solution.html) | Gotelli: Ch 9 |
| October 10 | **Practical Exam I** | [R Skills Practice](http://hompal-stats.wabarr.com/R_Skills_Practice1.html) | - |
| October 17 | [Tidy Data](http://hompal-stats.wabarr.com/presentations/tidyR/tidyR.html) & [ANOVA and ANCOVA](http://hompal-stats.wabarr.com/presentations/ANOVA/ANOVA.html) | [Homework #5](http://hompal-stats.wabarr.com/homework_assignment_5.html) - [Solution](http://hompal-stats.wabarr.com/HW_5_solution.html) - [Class Project Proposal Due](http://hompal-stats.wabarr.com/project_proposal_questions.html) | Gotelli: Ch 10 |
| October 24 | **Fall Break** | [Bonus - Advanced ggplot homework](http://hompal-stats.wabarr.com/advanced_ggplot_homework.html) - [solution](http://hompal-stats.wabarr.com/advanced_ggplot2_solution.html) | - |
| October 31 | [Power](http://hompal-stats.wabarr.com/presentations/power_analysis/power_analysis.html) & [Categorical Data](http://hompal-stats.wabarr.com/presentations/categorical_data/categorical_data.html) | [Homework #6](http://hompal-stats.wabarr.com/homework_assignment_6.html) - [Solution](http://hompal-stats.wabarr.com/HW_6_solution.html) | Gotelli: Ch 11 |
| November 7 | [Multivariate Stats: I](http://hompal-stats.wabarr.com/presentations/Multivariate_I/Multivariate_I.html) & [Multivariate Stats: II](http://hompal-stats.wabarr.com/presentations/Multivariate_II/Multivariate_II.html) | [Homework #7](http://hompal-stats.wabarr.com/homework_assignment_7.html) - [Solution](http://hompal-stats.wabarr.com/HW_7_solution.html) | Manly Ch. 1 - 5 |
| November 14 | [String Formatting and Filesystem](http://hompal-stats.wabarr.com/presentations/String_Formatting_Filesystem/String_Formatting_Filesystem.html) & [Workflow](http://hompal-stats.wabarr.com/presentations/workflow/workflow.html) & [Multivariate Stats: III](http://hompal-stats.wabarr.com/presentations/Multivariate_III/Multivariate_III.html) | [Homework #8](http://hompal-stats.wabarr.com/homework_assignment_8.html) - [Solution](http://hompal-stats.wabarr.com/HW_8_solution.html) | Manly Ch. 6 - 12 |
| November 21 | [Comparative Methods](http://hompal-stats.wabarr.com/presentations/comparative_methods/comparative_methods.html) | [Homework #9](http://hompal-stats.wabarr.com/homework_assignment_9.html) - [Solution](http://hompal-stats.wabarr.com/HW_9_solution.html) | - |
| November 28 | [Non-Parametrics](http://hompal-stats.wabarr.com/presentations/nonparametrics/nonparametrics) - [Spatial](http://hompal-stats.wabarr.com/presentations/spatial/spatial.html) | [Homework #10](http://hompal-stats.wabarr.com/homework_assignment_10.html) - [Solution](http://hompal-stats.wabarr.com/HW_10_solution.html) | - |
| December 5 | **Student Presentations** | [link to presentations](http://hompal-stats.wabarr.com/class_presentation_rubric_schedule.html) | - |
| December 12 | **Practical Exam II** | - | - |