SYLLABUS (FALL 2017)

PSYC 400A/532: General Linear Model
Days/Time: Monday/Wednesday: 5:00PM – 6:20PM
Location: MacLaurin D115
Instructor: Dr. John Sakaluk (He/Him/His) (sakaluk@uvic.ca)
Office/Office Hours: Cornett A240 (Wednesdays, 11AM – 12PM or by appointment)
Teach Assistant: Kari Duerksen (She/Her/Hers) (kariduerksen@uvic.ca)
Office/Office Hours: Cornett A148f (by appointment)

Required Texts:
- The book can either be downloaded for free (legally), or, if you prefer a hardcopy, you can purchase one rather cheaply (~$40 currently)

- The book can be accessed for free (legally) online here. However, if you plan on sticking around in R, a hardcopy (~$40) will be invaluable.

Assorted assigned readings from articles/chapters
- In addition to your textbook, I will post periodic readings from important articles/textbook chapters. Content from these readings is fair-game for tests.

Recommended Supplemental Texts:
- If I am successful in convincing you to “throw in” with R, then these two books will become everyday go-to resources for you. Much of their content can be found with a quick google if you are in a jam, but in my experience, the ~$75 to own both is well-worth the investment to be able to have them on-hand.

Required Software:
R: http://cran.stat.sfu.ca
- R is the primary data-analysis software we will be using for the course. It is free, and works on both Windows and Mac computers. Click the appropriate “Download and Install R” link, depending on your operating system, and the install the software from the downloaded file.

R Studio: https://www.rstudio.com/products/rstudio/download2/
- While R will be our primary statistics workhorse, it is not a very pretty program. R Studio is a free (and Windows-/Mac-friendly) supplemental program, that dresses R up a bit to make it more user-friendly and functional.

Another free program that is Windows- and Mac-friendly (see a theme here?...). Don’t worry about understanding what “power” is right now, but this is a program that is very helpful for performing power-related calculations.

Course Description
Psychologists of all description—social, clinical, cognitive, developmental, and others—must possess a sufficient mastery of statistics, for the purposes of conducting their own research, and evaluating others’. The general linear model encapsulates a broad array of data analysis techniques, and is typically considered the foundation of statistical training for psychologists. In our class, you will be learning to understand these analyses—and other important statistical principles—conceptually, as well as learning how to conduct, interpret, and report these analyses yourself.

But in the wake of widespread concerns about the reproducibility and replicability of psychological research findings, a foundational course like this must evolve beyond simply telling students which statistical model(s) to select, what buttons to push to get output, what pieces of output are “important”, and how to write descriptions of your results. This year therefore represents a first attempt at a drastic reformulation of what statistical training for budding researchers in our field should look like in the year 2017.

Specifically, in our course, you will also learn how to:
1. Self-teach, program scripts, visualize data, and work in a team—all increasingly necessary skills for a career in research
2. Make principled decisions about study design and statistical inference
3. Identify and capitalize on the benefits of pre-registration and exploratory research, in order to increase the convincingness and efficiency of your research
4. Create and manage reproducible research and data analysis workflows, so that other researchers can easily verify your findings
5. Calculate and judiciously use metrics of evidential value, in order to appropriately calibrate your level of skepticism for your/other’s research findings.

Group Work
Our class will take place in a high-tech “Active Learning Classroom”. You will be placed in “Pods” for the semester, based on an Intake Survey that I will send out prior to the first day of class; with few exceptions, Pod membership should remain consistent throughout the semester. Members of a Pod will work together throughout the semester on in-class activities, discussions, and labs. For Group Work, students will be evaluated both in terms of their Pod’s performance, as well as their performance within their Pod. It is likely that members of a Pod will cultivate a “niche” or “specialization”, for components of the class for which they are particularly skilled (e.g., results writing, data visualization, reproducible script creation, workflow management, model selection and coding, etc.). This is to be expected, and totally acceptable. And don’t worry—there will be plenty of individual assessment too.
Turning Assignments In
Many assignments (both Pod and Individual) will be managed and submitted via the Open Science Framework (OSF) system. Students are not expected to be familiar with the OSF at the start of class, and we will have a class day early-on dedicated to a tutorial explaining how it will be used in this way.

Simulating “Real World” Data Analysis in the Classroom
With very few exceptions and unless explicitly noted, you will always have access to your notes, previous code, and the Internet, when completing individual or group activities or assessments.

Evaluation and Grading Policy

<table>
<thead>
<tr>
<th>Item</th>
<th>Date</th>
<th>Points</th>
<th>% of Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual Assessments</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Camp R Tutorial</td>
<td>25</td>
<td>25</td>
<td>2.5%</td>
</tr>
<tr>
<td>Article Critique</td>
<td>50</td>
<td>50</td>
<td>5%</td>
</tr>
<tr>
<td>R Test 1</td>
<td>150</td>
<td>150</td>
<td>15%</td>
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<tr>
<td>R Test 2</td>
<td>150</td>
<td>150</td>
<td>15%</td>
</tr>
<tr>
<td>Written Test*</td>
<td>150</td>
<td>150</td>
<td>15%</td>
</tr>
<tr>
<td>Pod Contribution</td>
<td></td>
<td>Varies</td>
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<tr>
<td><strong>Pod Assessments</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pod Survey</td>
<td>25</td>
<td>25</td>
<td>2.5%</td>
</tr>
<tr>
<td><strong>Pod Assignments</strong></td>
<td></td>
<td></td>
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<tr>
<td>Reproducible Workflow</td>
<td>50</td>
<td>50</td>
<td>5%</td>
</tr>
<tr>
<td>Importing and Describing Data</td>
<td>50</td>
<td>50</td>
<td>5%</td>
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<tr>
<td>Data Visualization</td>
<td>50</td>
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<td>5%</td>
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<tr>
<td>Group Comparisons</td>
<td>50</td>
<td>50</td>
<td>5%</td>
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<tr>
<td>Modeling Associations</td>
<td>50</td>
<td>50</td>
<td>5%</td>
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<tr>
<td>Advanced Regression Models</td>
<td>50</td>
<td>50</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>1050</td>
<td>100%</td>
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* “Traditional” individual testing format, with no notes, code, Internet, etc., permitted.

The final letter grade in the course will be based on a total rounded percent score. For example 89.5 to 89.9 is rounded up to 90% (A+), whereas 89.4 is rounded down to 89% (A).

A+ = 90 – 100  B+ = 77 – 79  C+ = 65 – 69  F = 0 - 49
A  = 85 - 89  B = 73 – 76  C = 60 – 64
A- = 80 - 84  B- = 70 – 72  D = 50 - 59

Students are expected to familiarize themselves with the Important Course Policy Information (attached).

Data Camp R Tutorial (2.5%)
As many students will likely be mostly—if not totally—unfamiliar with using R, one of the first priorities of the class will be to get students comfortable with R syntax. Data Camp offers an
easy-to use online tutorial that will help to expose students to basics of R syntax and programming. The tutorial covers working with variables, vectors, matrices, factors, data frames, and lists—all common elements of R syntax that should serve you well to be familiar with, both for this class, and well beyond. In total, the tutorial should take approximately 4 hours to finish.

**Bonus: Additional Data Camp R Class (+2.5%)**
Data Camp has supplied our class with their entire suite of R-related courses for free (would cost $$$$ on your own). You are encouraged to take advantage of as many of these classes as you would like—access expires at the end of the course. If you submit a certificate of completion from one of these additional classes, you will be credited an additional 25 points (one-time only).

**Article Critique (5%)**
You will be asked to write a brief (~5 page) critique of an empirical article, based on what you learn about replicability and evidential value. Details of this assignment will be posted on the class website.

**R Tests (15% each x2)**
There will be two R tests, during which you will have class time to individually pre-register, analyze, and visualize an assigned data set, as well as write-up the results of your analyses, and store all necessary materials in a reproducible workflow on an OSF project.

**Written Test (15%)**
There will be one traditional written test, generally consisting of multiple choice, matching, and short answer questions. This test is to determine whether you have learned the necessary conceptual material of the course—you will not be asked to reproduce R code for it, but you may be asked to interpret output/graphs.

**Pod Contribution (multiplier of Pod Assignments)**
Students will be rated by their Pod members (and myself) in terms of their contribution to the Pod. This contribution level will be used as a multiplier for each student’s total Pod Assignments grade: their final contribution level will be determined by a simple majority vote (I will serve as a tie-breaker, when necessary). In effect, this makes the contribution of assignments to students’ final grade a combination of their group score and individual contribution level.

*Contribution Level*

**Underwhelming (.85 multiplier):** Student did not contribute adequately to the Pod’s group work

**Acceptable (1.0 multiplier):** Student contributed adequately to the Pod’s group work

**Exemplary (1.15 multiplier):** Student exceeded expectations of contributing to Pod’s group work

**Overbearing (.85 multiplier):** Student regularly tried did too much, or “took over” the Pod

*Part of effective group work is communicating expectations and checking in regularly. I encourage you to periodically discuss how Pod dynamics are going, so there are no surprises at semester-end.*
Examples:

John’s Pod ends with a total pod assignment grade of 250/300. Three of his four Pod members rate his contribution as underwhelming, so his new final pod assignment score is \(0.85 \times 250 = 212.50/300\).

Kari’s Pod ends with a total pod assignment grade of 300/300. Two of her four Pod members rate her contribution as exemplary, and the Instructor agrees (breaking any tie), so her new final pod assignment score is \(1.15 \times 300 = 345\).

Final Project (15%)

Students will be asked to write a final paper consisting of an introduction, pre-registered hypotheses, analyses, and visualizations (all in a reproducible workflow), and a discussion section, all using reproducible research practices. Students will be able to select data from any number of already-available data sources (e.g., their advisor’s labs, data frames included in R packages, public-access datasets online). Details of this assignment will be posted on the class website.

Pod Survey (2.5%)

In order to create balanced Pods, I need students to complete a very brief survey that will give me a quick overview of their areas of strength and comfort with skills that will be necessary throughout the course.

Pod Assignments (5% each x6)

Pods will work together on six (loosely) incremental assignments, that will require them to collaborate to first set up a reproducible group workflow, and then perform and report on various statistical analyses through that workflow. Pod grades will not only be determined by whether the submitted assignment is “right” (20 pts), but also to what extent it is reproducible (30 pts). Details of these assignments will be posted on the class website.

Respect for Diversity

It is my intent that students from all diverse backgrounds and perspectives be well-served by this course, that students’ learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socio-economic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you.
### Tentative Schedule of Dates*

*Topics/dates subject to change at my discretion pending class progress*

<table>
<thead>
<tr>
<th>Week/Day</th>
<th>Date</th>
<th>Topic(s)</th>
<th>Reminders</th>
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<tbody>
<tr>
<td>1</td>
<td>Wed</td>
<td>Sept. 6</td>
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<tr>
<td></td>
<td></td>
<td>• Class Intro</td>
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<td></td>
<td></td>
<td>• Evidential value</td>
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<tr>
<td></td>
<td></td>
<td>• Pod Survey due SUNDAY Sept. 10 at 11:59 PM</td>
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<tr>
<td>2</td>
<td>Mon</td>
<td>Sept. 11</td>
<td></td>
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</tbody>
</table>
|          |        | • Tools of Statistical Inference  
• Meet your pods  
• What is a p-value?  
• Borderline p-values demo1 and demo2 |                                                |
| 2        | Wed    | Sept. 13                                                                  |                                                |
|          |        | • Replicability and Reproducibility  
• G*Power and p-Checker  
• p-hacking simulator |                                                |
| 3        | Mon    | Sept. 18                                                                  |                                                |
|          |        | • Setting up a replicable and reproducible workflow  
• The Open Science Framework and pre-registration |                                                |
|          |        | • Article Critique due                                                   |                                                |
| 3        | Wed    | Sept. 20                                                                  |                                                |
|          |        | • R Data Management  
• Importing and describing data |                                                |
|          |        | • Data Camp tutorial due  
• Reproducible workflow assignment due |                                                |
| 4        | Mon    | Sept. 25                                                                  |                                                |
|          |        | • Visualizing Data  
• Making pretty plots                                                      |                                                |
|          |        | • Importing and describing data assignment due                           |                                                |
| 4        | Wed    | Sept. 27                                                                  |                                                |
|          |        | • Simple Group Comparisons  
• t-tests in R                                                              |                                                |
|          |        | • Data visualization assignment due                                        |                                                |
| 5        | Mon    | Oct. 2                                                                    |                                                |
|          |        | • Less-Simple Group Comparisons  
• ANOVAs in R                                                               |                                                |
| 5        | Wed    | Oct. 4                                                                    | **Lab Test 1 (Weeks 3-5)**                   |
|          |        | • Group Comparisons assignment due                                        |                                                |
| 6        | Mon    | Oct. 9                                                                    | **NO CLASS (THANKSGIVING)**                   |
| 6        | Wed    | Oct. 11                                                                   |                                                |
|          |        | • Measures of Association and Model Testing  
• Correlation and bivariate regression model-building in R                  |                                                |
<p>| 7        | Mon    | Oct. 16                                                                   |                                                |
|          |        | • Categorical Predictors and Multiple Regression Models                   |                                                |
| 7        | Wed    | Oct. 18                                                                   | <strong>JOHN AWAY @ CONFERENCE</strong>                    |
| 8        | Mon    | Oct. 23                                                                   |                                                |
|          |        | • Categorical Predictors and Multiple                                       |                                                |</p>
<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Wed</td>
<td>Oct. 25</td>
<td>Interactions in Regression</td>
<td>Modeling associations assignment due</td>
</tr>
<tr>
<td>9</td>
<td>Mon</td>
<td>Oct. 30</td>
<td>Interactions in Regression in R</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Wed</td>
<td>Nov. 1</td>
<td>Other Advanced Linear Models</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mon</td>
<td>Nov. 6</td>
<td>Curvilinear and mediation models in R</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Wed</td>
<td>Nov. 8</td>
<td>JOHN AWAY @ CONFERENCE</td>
<td>Advanced regression models assignment due</td>
</tr>
<tr>
<td>11</td>
<td>Mon</td>
<td>Nov. 13</td>
<td>NO CLASS (READING WEEK)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Wed</td>
<td>Nov. 15</td>
<td></td>
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<tr>
<td>12</td>
<td>Mon</td>
<td>Nov. 20</td>
<td>Lab Test 2 (Weeks 6-12)</td>
<td></td>
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<tr>
<td>12</td>
<td>Wed</td>
<td>Nov. 22</td>
<td>Kari Lectures (Topic TBD)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Mon</td>
<td>Nov. 27</td>
<td>Review, cookies, and work-day for Final Assignment</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Wed</td>
<td>Nov. 29</td>
<td>Written Test</td>
<td>Final Assignment (due Thurs Nov. 30, 11:59 PM)</td>
</tr>
</tbody>
</table>
Prerequisites

Students who remain in courses for which they do not have the prerequisites do so at their own risk. Students who complete courses without prerequisites ARE NOT exempt from having to complete the prerequisite course(s) if such courses are required for the degree program.

Program Requirements

For more information see pages 308-313 of the UVic Calendar September 2017.

Registration Status

Students are responsible for verifying their registration status. Registration status may be verified using My Page, View Schedule. Course adds and drops will not be processed after the deadlines set out in the current UVic Calendar.

Commitment to Inclusivity and Diversity

The University of Victoria is committed to promoting, providing and protecting a positive and supportive and safe learning and working environment for all its members.

In the Event of Illness, Accident or Family Affliction (See UVic Calendar, September 2017, p. 49-51)

- **What to do if you miss the final exam scheduled during the formal exam period**

Apply at Records Services for a “Request for Academic Concession”, normally within 10 working days of the date of the exam. Records Services will forward the form to the instructor. If the concession is granted, the instructor will determine how to deal with the situation (for example, a deferred exam). Where a concession is not applied for or where such application is denied, an N grade will be entered on the student’s academic record.

OR, you can download the Request for Academic Concession form here: [http://www.uvic.ca/registrar/assets/docs/record-forms/rac.pdf](http://www.uvic.ca/registrar/assets/docs/record-forms/rac.pdf)

- **What to do if you miss an exam other than one scheduled during the formal exam period**

Do not apply at Records Services for a “Request for Academic Concession”. Instead submit documentation of the illness, accident or family affliction directly to your course instructor (or designated teaching assistant).

- **What to do if you require additional time to complete course requirements**

Apply at Records Services for a “Request for Academic Concession”, normally within 10 working days of the end of the course. Records Services will forward the form to the instructor. If the concession is granted, the instructor will determine how to deal with the situation (for example, a deferred exam). Where a concession is not applied for or where such application is denied, an N grade will be entered on the student’s academic record.

OR, you can download the Request for Academic Concession form here: [http://www.uvic.ca/registrar/assets/docs/record-forms/rac.pdf](http://www.uvic.ca/registrar/assets/docs/record-forms/rac.pdf)
Policy on Academic Integrity including Plagiarism and Cheating

The Department of Psychology fully endorses and intends to enforce rigorously the Senate Policy on Academic integrity [http://web.uvic.ca/calendar2017-09/undergrad/info/regulations/academic-integrity.html](http://web.uvic.ca/calendar2017-09/undergrad/info/regulations/academic-integrity.html), p. 46-48, UVic Calendar September 2017). It is of utmost importance that students who do their work honestly be protected from those who do not. Because this policy is in place to ensure that students carry out and benefit from the learning activities assigned in each course, it is expected that students will cooperate in its implementation.

The offences defined by the policy can be summarized briefly as follows:

1. **Plagiarism.** You must make sure that the work you submit is your work and not someone else’s. There are proper procedures for citing the works of others. The student is responsible for being aware of and using these procedures.

2. **Unauthorized Use of an Editor.** The use of an editor is prohibited unless the instructor grants explicit written authorization.

3. **Multiple Submission.** Only under exceptional circumstances may a work submitted to fulfill an academic requirement be used to satisfy another similar requirement. The student is responsible for clarifying this with the instructor(s) involved.

4. **Falsifying Materials Subject to Academic Evaluation.** This includes falsification of data, use of commercially prepared essays, using information from the Internet without proper citation, citing sources from which material is not actually obtained, etc.

5. **Cheating on Assignments, Tests, and Examinations.** You may not copy the work of others in or out of class; you may not give your work to others for the purpose of copying; you may not use unauthorized material or equipment during examinations or tests; and you may not impersonate or allow yourself to be impersonated by another at an examination. The Department of Psychology has a policy of not making old examinations available for study purposes. Therefore, use of old exams without the express written permission of the instructor constitutes cheating by the user, and abetting of cheating by the person who provided the exam.

6. **Being an Accessory to Offences.** This means that helping another student to cheat (for instance, by showing or communicating to them answers to an assignment, or by allowing them to view answers on an exam) is an academic offence.

Instructors are expected to make every effort to prevent cheating and plagiarism. This may include the assignment of seating for examinations, asking students to move during examinations, requests to see student identification cards, and other measures as appropriate. Instructors also have available to them a variety of tools and procedures to check for Internet and electronic media-based cheating. In instances of suspected or actual plagiarism or cheating, instructors, following prescribed procedures, are authorized to take steps consistent with the degree of the offence. These measures will range from a zero on the test or assignment or a failing grade for the course, probation within a program to temporary or even permanent suspension from the University.

Rights of Appeal are described in the Policy on Academic Integrity in the University calendar (on p. 47 in September 2017).

The definitive source for information on Academic Integrity is the University Calendar (p. 46-48 in September 2017) ([http://web.uvic.ca/calendar2017-09/undergrad/info/regulations/academic-integrity.html](http://web.uvic.ca/calendar2017-09/undergrad/info/regulations/academic-integrity.html))

Other useful resources on Plagiarism and Cheating include:

1. The Study Solutions Office: [https://www.uvic.ca/services/counselling/success/study/index.php](https://www.uvic.ca/services/counselling/success/study/index.php)
2. The Ombudsperson’s office: [http://www.uvss.uvic.ca/ombudsperson/pubsguides/plagiarism.pdf](http://www.uvss.uvic.ca/ombudsperson/pubsguides/plagiarism.pdf)