Western University
Psychology
PSY 9552B
Regression and Factor Analysis Methods
Winter 2023
SSC XXXX, Wed 9:00am-12noon

Enrollment Restrictions
Enrollment in this course is restricted to graduate students in Psychology as well as any student in another program (pending class size) who has obtained special permission to enroll in this course from the course instructor as well as the Graduate Chair (or equivalent) from the student’s home program.

Instructor and Information
Instructor: Paul F. Tremblay
Office: SSC 6336
Office Phone: (519) 661-2111 x85644
Office Hours: by appointment
Email: ptrembla@uwo.ca

Teaching Assistant: TBD
Email: TBD

Course Description
This course covers various regression-based procedures that fall within the general linear model as well as an introduction to generalized linear model methods such as logistic, multinomial, ordinal and poisson regression. Within multiple linear regression, we cover moderation and non-experimental design in depth including concepts of causality and methods of statistical control. We consider limitations of traditional mediation designs and improved methods. The course includes demonstrations of the parallels between regression methods and both ANOVA and ANCOVA, and also introduces multilevel modeling. Also covered are factor analytic methods including exploratory and confirmatory approaches in the context of test construction and validation. The course work consists entirely of lab assignments that provide hands-on training in generating hypotheses and designs, conducting power analyses and analyzing data, interpreting and reporting results. Demonstrations are provided using various software (e.g., R, Jamovi, JASP, Mplus, and SPSS).

Course Format
Lectures in person
Course Learning Outcomes/Objectives

Upon completion of this course, students should be able to:

1. Design, conduct power analyses, analyze and report studies using regression approaches.
2. Test for moderation (i.e., interactions) and report using up-to-date methods.
3. Critically evaluate the limitations of traditional mediation methods and apply the new guidelines.
4. Design, analyze, and interpret the two basic designs in multilevel modeling (people within groups, and repeated observations within people).
5. Analyze, interpret, and report exploratory and confirmatory factor analyses.

Course Materials

The following textbook is optional and can serve as a secondary resource. It will be available online through our Western library and can be accessed through the OWL course page. You will be able to download sections in pdf.


A list of supplementary articles and book chapters (available electronically through the library system or in the OWL course website) are listed below by lecture topics. These are additional resources that may serve you beyond this course in your own research. I will discuss most of these in my lecture material.

Methods of Evaluation

The course work consists entirely of **6 equally weighted (~16.5% each)** lab assignments provided every two weeks starting Jan 18. You will have two weeks to complete each assignment. These assignments provide hands-on training by having you generate hypotheses, analyze data, interpret and report results, write mini research proposals, or evaluate published research. My lectures and demonstrations include presentations in R (and the related Jamovi software) and SPSS. Students are allowed to work in any software package or programming language of their choice including any not mentioned above (e.g., SAS, Stata, Python or MATLAB).

Assignment reports will typically consist of a two double-spaced page write-up including a short method section, results section including tables and/or figures, interpretation and discussion of results, answers to specific questions, and an appendix with analysis output.

Late assignments will receive a 5% deduction per 24 hours. Assignments that are more than one week late will not be accepted for partial marks unless you have contacted me to request an extension.

**Rules about working in groups**. I am supportive of students working in pairs or groups to conduct the analyses and discuss the assignments. However, you are required to write your own report with no duplication from your colleagues’ work. The assignments will often require you to choose a subset of variables, to make decisions about plausible strategies, or to describe research ideas from your own
area of interest. Also, some questions will ask you to design your own hypothetical research designs. As a result, it is unlikely that two students will work with the exact same material.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Due date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Lab1</td>
<td>Feb 1</td>
<td>Bivariate regression</td>
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<tr>
<td>Lab2</td>
<td>Feb 15</td>
<td>Multiple regression</td>
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<td>Lab3</td>
<td>Mar 8</td>
<td>Moderation</td>
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<td>Lab4</td>
<td>Mar 22</td>
<td>Mediation</td>
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<td>Lab5</td>
<td>Apr 5</td>
<td>Multilevel modeling</td>
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<td>Lab6</td>
<td>Apr 17</td>
<td>Factor analysis</td>
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Assignments are provided two weeks before the due date.

**Course Timeline**

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Suggested chapters from Hahs-Vaughn &amp; Lomax (2020)</th>
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<tbody>
<tr>
<td>1</td>
<td>Jan 11</td>
<td>Measures of Association and their Inferential Tests</td>
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<tr>
<td>2</td>
<td>Jan 18</td>
<td>Bivariate Linear Regression</td>
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<tr>
<td>3</td>
<td>Jan 25</td>
<td>Multiple Correlation – Statistical Control Methods</td>
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<td>4</td>
<td>Feb 1</td>
<td>Multiple Regression (MR)</td>
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<td>5</td>
<td>Feb 8</td>
<td>Categorical Predictors in MR, similarity to ANOVA</td>
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<td>6</td>
<td>Feb 15</td>
<td>Moderation in MR</td>
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<td>7</td>
<td>Spring R</td>
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<td>8</td>
<td>Mar 1</td>
<td>Mediation in MR and Extensions</td>
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<tr>
<td>9</td>
<td>Mar 8</td>
<td>Logistic Regression and Other Regression Models</td>
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<tr>
<td>10</td>
<td>Mar 15</td>
<td>Multilevel Modeling-I – Subjects Within Groups</td>
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<td>11</td>
<td>Mar 22</td>
<td>Multilevel Modeling-II – Observations within Individuals</td>
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<td>12</td>
<td>Mar 29</td>
<td>Factor Analysis</td>
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<td>13</td>
<td>Apr 5</td>
<td>Confirmatory Factor Analysis</td>
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Additional resources for lecture topics (list may be slightly updated before start of course)

**Jan 11.**


Jan 18.

Jan 25.

Feb 1.

Feb 8.

Feb 15.

Mar 1.

version 06/13/2022 4
Mar 8.

Mar 15.

Mar 22.

Mar 29.

Apr 5.

**Statement on Academic Offences**
Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: [http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf)
**Health/Wellness Services**
Students who are in emotional/mental distress should refer to Mental Health@Western [http://www.uwo.ca/uwocom/mentalhealth/](http://www.uwo.ca/uwocom/mentalhealth/) for a complete list of options about how to obtain help.

**Accessible Education Western (AEW)**
Western is committed to achieving barrier-free accessibility for all its members, including graduate students. As part of this commitment, Western provides a variety of services devoted to promoting, advocating, and accommodating persons with disabilities in their respective graduate program.

Graduate students with disabilities (for example, chronic illnesses, mental health conditions, mobility impairments) are strongly encouraged to register with Accessible Education Western (AEW), a confidential service designed to support graduate and undergraduate students through their academic program. With the appropriate documentation, the student will work with both AEW and their graduate programs (normally their Graduate Chair and/or Course instructor) to ensure that appropriate academic accommodations to program requirements are arranged. These accommodations include individual counselling, alternative formatted literature, accessible campus transportation, learning strategy instruction, writing exams and assistive technology instruction.