Technical Requirements

- Stable internet connection
- Laptop or computer

Important Dates

<table>
<thead>
<tr>
<th>Classes Start</th>
<th>Drop Deadline</th>
<th>Classes End</th>
<th>Exam Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 10</td>
<td>March 14</td>
<td>April 8</td>
<td>April 10-30</td>
</tr>
</tbody>
</table>

*Last day to drop a first-term half-course without academic penalty.

Course Information

Biology/Statistics 2244B, sections 001 and 002, FW21

An introductory course in the application of statistical methods, intended for students in departments other than Statistical and Actuarial Sciences, Applied Mathematics, Mathematics, or students in the Faculty of Engineering. Topics include sampling, confidence intervals, analysis of variance, regression and correlation. Cannot be taken for credit in any module in Statistics, Actuarial Science, or Financial Modelling.

List of Prerequisite(s)

A full (1.0) mathematics course, or equivalent, numbered 1000 or above. Statistical Sciences 1024A/B can be used to meet 0.5 of the 1.0 mathematics course requirement.

List of Antirequisite(s)


Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.
Instructor Information

**Course Coordinator**
Jennifer Peter

**Contact Information**
Use OWL Messages to Jennifer Peter

My email address is too close to someone else’s; using OWL Messages avoids lost/misdirected communications and helps me organize my inbox. It also ensures that you use your UWO contact information to connect with me.

**Student Hours**
Student hours (times through Zoom to meet with your instructor to get help, etc.) will occur weekly, with times determined by a student poll at the start of term.

Course Schedule and Delivery Mode

**Universal Design for Learning**

This course has been designed using the principles of *Universal Design for Learning* ("UDL"), which “focuses on eliminating barriers through initial designs that consider the needs of diverse people”\(^1\). Consequently, you will encounter choice for many parts of the course: course material will be available in multiple formats, some assessments will offer a choice of topic/approach, and, diagnostic assessments will be available for most course topics to help you efficiently allocate your time for learning the course material. One major side effect of this design is that it will look like there is a lot to do for the course. Keep in mind that some of the available content will be redundant and is available simply to support your preferred learning approach or interests.

**Delivery of course material**

This course is timetabled as an in-person course (except for January, when the University has placed us online). That means that the lectures occur on campus, at the times/locations described in the table on the next page. However, in keeping with Universal Design for Learning, the *lecture material* will also be available as pre-recorded online modules on the OWL course site; students may choose the delivery mode that best suits their needs/wants. The *lab material* will be presented as a series of *online modules* through the OWL course site (in keeping with previous years of the course).

---

The schedule for in-person components is provided in the following table. Note that the lab sections will **NOT** be used each week of the term; refer to the Calendar on OWL and course communications about when the lab periods will be used.

<table>
<thead>
<tr>
<th>Component</th>
<th>Section</th>
<th>Days/Times</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>001</td>
<td>Wednesdays/Fridays, 12:30-1:30 pm EST</td>
<td>HSB 40</td>
</tr>
<tr>
<td></td>
<td>002</td>
<td>Tuesdays/Thursdays, 3:30-4:30 pm EST</td>
<td>NSC 1</td>
</tr>
<tr>
<td>Labs</td>
<td>004</td>
<td>Tuesdays, 6:30-9:30 pm EST</td>
<td>HSB 14</td>
</tr>
<tr>
<td></td>
<td>005</td>
<td>Wednesdays, 6:30-9:30 pm EST</td>
<td>HSB 16</td>
</tr>
<tr>
<td></td>
<td>006</td>
<td>Wednesdays, 6:30-9:30 pm EST</td>
<td>HSB 14</td>
</tr>
<tr>
<td></td>
<td>007</td>
<td>Wednesdays, 6:30-9:30 pm EST</td>
<td>NCB 105</td>
</tr>
<tr>
<td></td>
<td>008</td>
<td>Thursdays, 6:30-9:30 pm EST</td>
<td>HSB 13</td>
</tr>
<tr>
<td></td>
<td>009</td>
<td>Thursdays, 6:30-9:30 pm EST</td>
<td>HSB 16</td>
</tr>
<tr>
<td></td>
<td>010</td>
<td>Thursdays, 6:30-9:30 pm EST</td>
<td>HSB 14</td>
</tr>
<tr>
<td></td>
<td>011</td>
<td>Tuesdays, 1:30-4:30 pm EST</td>
<td>HSB 13</td>
</tr>
<tr>
<td></td>
<td>012</td>
<td>Wednesdays, 1:30-4:30 pm EST</td>
<td>HSB 14</td>
</tr>
<tr>
<td></td>
<td>013</td>
<td>Thursdays, 6:30-9:30 pm EST</td>
<td>NCB 105</td>
</tr>
<tr>
<td></td>
<td>014</td>
<td>Tuesdays, 1:30-4:30 pm EST</td>
<td>HSB 16</td>
</tr>
<tr>
<td></td>
<td>015</td>
<td>Fridays, 11:30-2:30 pm EST</td>
<td>HSB 14</td>
</tr>
<tr>
<td></td>
<td>016</td>
<td>Tuesdays, 6:30-9:30 pm EST</td>
<td>NCB 105</td>
</tr>
</tbody>
</table>

**Course delivery and assessment with respect to COVID-19 pandemic**

Although the intent is for this course to be delivered in-person to the extent possible, the changing COVID-19 landscape may necessitate some or all of the course to be delivered online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience), as deemed most appropriate by the instructor. The grading scheme will not change. Any assessments affected will be conducted online as determined by the course instructor.

When deemed necessary, tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledging that you will be required to provide personal information (including some biometric data) and that the session will be recorded. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at: [https://remotepronctoring.uwo.ca](https://remotepronctoring.uwo.ca).
Learning Outcomes

This course is meant to be both introductory and comprehensive, conceptual and practical. At a fundamental level, the course is organized to **demonstrate that statistics is a scientific discipline that can and should inform research at all stages**, from problem definition to data interpretation and conclusion. To reinforce this over-arching learning outcome, the course topics are organized around a “backbone” based on the PPDAC framework for scientific inquiry (MacKay and Oldford 2000).

More specifically, by the end of the course, a successful student should be able to:

| Design sampling and study procedures to collect relevant data addressing a research question. | • Distinguish among common sampling and study designs.  
• Identify issues associated with sampling and study design (e.g. bias, validity, confounding, control, reproducibility)  
• Identify relevant inference procedures based on research question and variables. |
|---|---|
| Create and interpret appropriate summaries of data. | • Select summaries based on research question and variables.  
• Interpret summaries to identify and/or describe patterns, trends, and interesting features in data. |
| Analyse data using inference procedures to address a research question. | • Select appropriate inference procedures for a research question.  
• Interpret and describe confidence intervals and hypothesis test results.  
• Evaluate the fit of models for common parametric inference procedures.  
• Recognize situations and data that may require alternative (i.e. not covered in this course) inference procedures. |
| Use statistical software to explore, summarize, analyse, interpret, and communicate data. | • Use R to create and modify graphical and numerical summaries of data.  
• Use R to conduct common parametric inference procedures, including evaluating conditions for model fit.  
• Interpret R (including accompanying code) or other statistical software output correctly. |
| Communicate statistical concepts, analyses, and arguments in an accurate and scholarly manner. | • Apply vocabulary to describe statistical concepts, procedures, and ideas.  
• Apply conventional formats for reporting and interpreting results of statistical analyses in written/graphical form.  
• Justify the choice of statistical procedures (e.g. selected study designs). |
| Describe models and/or conceptual background for common inference procedures. | • Describe the models for common inference procedures.  
• Describe sampling distributions (based on simple random samples) for commonly used statistics. |
Course timetable
Some adjustments to this timetable may be made based on our progression through the material; any changes to due dates will be announced on OWL.

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture/Lab Topic(s)</th>
<th>Assignments due Friday at 11:55 pm EST</th>
<th>Activities due Friday at 11:55 pm EST *Not all of these are required!</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 10-16</td>
<td>PPDAC: A scientific inquiry framework Sampling designs &amp; considerations</td>
<td></td>
<td></td>
<td>Dates are tentative, subject to Exam Central confirmation</td>
</tr>
<tr>
<td>Jan 17-23</td>
<td>Study designs &amp; considerations Lab 1: Getting to know R</td>
<td></td>
<td>• Reflection 1 – Planning</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• CORE 1 - Representativeness of sampling</td>
<td></td>
</tr>
<tr>
<td>Jan 24-30</td>
<td>Planning ahead: Sampling variability Summarizing &amp; Exploring Data Lab 2: Working with Data in R</td>
<td></td>
<td>• Application 1 - Plan stage</td>
<td></td>
</tr>
<tr>
<td>Jan 31-Feb 6</td>
<td>Probability Models &amp; Vocabulary Probability Models: Binomial models Lab 3: R script and R markdown files</td>
<td>Assignment 1: Problem and Plan</td>
<td></td>
<td>• Summary 1 - Data summaries</td>
</tr>
<tr>
<td>Feb 7-13</td>
<td>Probability Models: Normal models Lab 4: Summarizing &amp; Visualizing Data in R</td>
<td></td>
<td>• CORE 2 - Sampling distributions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• R practice 1 - Working with data in RMD files</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Application 2 - Choosing summaries</td>
<td></td>
</tr>
<tr>
<td>Feb 14-20</td>
<td>Sampling distributions</td>
<td>Resource File Project Phase 1</td>
<td>• R practice 2 - Summarizing data</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Reflection 2 – Looking backward</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• CORE 3 – Confidence Intervals</td>
<td></td>
</tr>
<tr>
<td>Feb 21-27</td>
<td></td>
<td></td>
<td></td>
<td>Reading week (no classes)</td>
</tr>
<tr>
<td>Feb 28-Mar 6</td>
<td>Understanding confidence intervals t confidence interval for the mean</td>
<td>Assignment 2: Data</td>
<td></td>
<td>Test 1 – Sunday, Feb. 13, 2:00–3:00 pm EST</td>
</tr>
<tr>
<td>Mar 7-13</td>
<td>Large sample confidence interval for proportion Understanding null hypothesis testing Lab 5: t procedures for means in R</td>
<td></td>
<td>• Reflection 3 – Looking forward</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Application 3 - Distributions</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Summary 2 - Describing data</td>
<td></td>
</tr>
<tr>
<td>Mar 14-20</td>
<td>Large sample test for the proportion t test for the mean Lab 6: large sample procedures for proportions in R</td>
<td>Resource File Project Phase 2</td>
<td>• Summary 3 – Models</td>
<td>Test 2 – Friday, Mar. 11, 7:00–8:00 pm EST Test 1 make-up – Friday, Mar. 11, 8:00-9:00 pm EST</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td>Assignment/Resource</td>
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<tr>
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</tr>
<tr>
<td>Mar 21-27</td>
<td>t confidence interval and test for difference in means</td>
<td>Assignment 3: Analysis R practice 3 - Inference Application 4 - Choosing procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large sample confidence interval and test for difference in proportions</td>
<td>Lab 7: two sample procedures in R</td>
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<td></td>
<td>Lab 8: Linear regression in R</td>
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</tr>
<tr>
<td>Mar 28-Apr 3</td>
<td>Simple linear regression (t confidence interval and test for slope)</td>
<td>Assignment 4: Analysis &amp; Conclusion R practice 4 – Review Summary 4 – Inference procedures</td>
<td></td>
<td></td>
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<tr>
<td>Lab 8: Linear regression in R</td>
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<tr>
<td>Apr 4-8</td>
<td>One-factor ANOVA and follow up analyses</td>
<td>Resource File Project Phase 3 R practice 4 – Review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab 9: One-factor ANOVA in R</td>
<td></td>
<td>Summary 4 – Inference procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr 10-30</td>
<td>Final Exam Period; do not book travel, etc. until exam schedule is finalized.</td>
<td></td>
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</tbody>
</table>

**Course Materials**

**Required materials**

These materials are "required" in that each student needs access to them to be successful in the course. Whether that access is individual, shared digitally by a group of individuals, or borrowed from the commons is up to you. In addition to these three main resources, we will occasionally use articles, videos, and applets available freely online to supplement your learning. *If you discover any (open access) resources that are helpful to you for this course, I encourage you to share the details with the rest of the class!*

The OWL site ([http://owl.uwo.ca](http://owl.uwo.ca), “STAT 2244B 001 FW21”) is used heavily; students are responsible for checking the site on a regular basis. It provides:

- Lecture and lab materials
- Assignment instructions and materials
- Access to graded assessments
- Practice questions
- Communication tools (Zoom, OWL Messages, Forums)

The Lab component of the course requires using the statistical software program R and the integrated development environment, R Studio to work with data and communicate. Both software packages are free to download to your personal computer (best experience) or for limited use through a browser (if necessary). Instructions for downloading/accessing R and R Studio is on the OWL site as part of Lab 1.

If you are the type of student who finds having a textbook helpful, the 'official' course textbook is: Baldi, B. and DS. Moore. 2018. *The Practice of Statistics in the Life Sciences*. 4th Ed., W.H. Freeman and Company. This book is available in hard copy or ebook on the platform “Achieve” (a limited term subscription, cheapest through the UWO Bookstore). I also provide open-access (i.e. free) equivalents for many course topics where possible. **The textbook is NOT required.**

If you need assistance with OWL, please seek support on the [OWL Help page](http://owl.uwo.ca). Alternatively, contact the [Western Technology Services Helpdesk](http://owl.uwo.ca) (by phone at 519-661-3800 or ext. 83800). [Google Chrome](http://owl.uwo.ca) or [Mozilla Firefox](http://owl.uwo.ca) are the preferred browsers to optimally use OWL and our course materials. Ensure your browser is up-to-date.
**Methods of Evaluation**

This course uses a combination of more traditional grading schemes and *Specifications Grading*; the information provided below should be sufficient to understand how your grade will be calculated. However, if at ANY time you are uncertain on how your grade is determined, or what is required to earn credit for the course, ask for clarification. If you’re interested in learning more about “Specs Grading” in general, there’s a great blog post about it available [here](#).

### Overview

Your course grade is determined through a combination of the *quality* and *quantity* of the work you submit. Your grade is composed of two (2) components:

1. **Your ‘**Base Grade**’ of 40%, 50%, 60%, or 65%;** the base grade is determined by the grades earned on *Assignments* and the *Activities* you successfully complete, as well as your success on the *Final Exam*. The Base Grade is an implementation of Specifications Grading.

2. **Your ‘**Grade Increments**’ which add additional percentage points onto your Base Grade** using elements of a more traditional grading approach, based on your success on:
   - the two *Tests* (15% total)
   - the *Final Exam* (10%)
   - the *Resource File Project* (10%)

### Determine your Base Grade

Your Base Grade is based on the highest graded ‘bundle’ of accomplishments that you fulfill in its entirety.

<table>
<thead>
<tr>
<th>To earn:</th>
<th>Accomplish ALL of the following:</th>
</tr>
</thead>
</table>
| 65       | • submit all four (4) *Assignments*  
          | • earn a grade of *rubric level 4* on each of the four (4) *Assignments*  
          | • earn credit for all 3 *Core Activities*  
          | • earn credit for 1 *Activity* from each of the following *Activity* classes: (i) *Summary*, (ii) *R practice*, (iii) *Application*, (iv) *Reflection*  
          | • earn credit for 3 additional *Activities* of your choice  
          | • earn a grade of at least *85%* on the *Final Exam* (see note * below) |
| 60       | • submit all four (4) *Assignments*  
          | • earn a grade of at least *rubric level 3* on each of the four (4) *Assignments*  
          | • submit all 3 *Core Activities* and earn credit for at least 2 of the 3 *Core Activities*  
          | • earn credit for 1 *Activity* from each of the following *Activity* classes: (i) *Summary*, (ii) *R practice*  
          | • earn credit for 2 additional non-core *Activities* of your choice  
          | • earn a grade of at least *75%* on the *Final Exam* (see note * below) |
| 50       | • submit all four (4) *Assignments*  
          | • earn a grade of at least *rubric level 3* on at least 3 of the four (4) *Assignments*  
          | • earn credit for at least 6 *Activities* of your choice  
          | • earn a grade of at least *50%* on the *Final Exam* (see note * below) |
| 40       | • submit at least three (3) of the four (4) *Assignments*  
          | • earn a grade of at least *rubric level 2* on at least 3 of the four (4) *Assignments*  
          | • earn credit for at least 6 *Activities* of your choice  
          | • earn a grade of at least *50%* on the *Final Exam* (see note * below) |

*Failing to meet the specified minimum grade for the *Final Exam* will result in a 5% deduction from the Base Grade (assuming all other requirements for the Base Grade are met). For example, a student working towards a Base Grade of 60% who does not earn at least 75% on the *Final Exam* will earn a Base Grade of 60% – 5% = 55% (to which their Grade Increments will be added as normal).
Failing to meet the specifications for the 40 Base Grade will result in a final course grade of 45% being assigned, regardless of success on the Grade Increments. This means that the minimum that must be achieved to be eligible to earn credit (i.e. ‘pass’/50%) in Biology/Statistics 2244 is the specifications for the 40 Base Grade, plus sufficient percentage points earned through the Grade Increments, and any other Essential Requirements (described below).

Determine your Grade Increments

Up to 35% could be added to the Base Grade earned, according to your achievement with the Tests, Final Exam, and Resource File Project.

Final Exam Increment. Any achievement on the Final Exam above the required minimum mark for your Base Grade can earn you up to an additional 10%. Remember that each Base Grade level has a minimal requirement for the Final Exam mark (e.g. Base Grade of 65% requires a minimum of 85% on the Final Exam). This Final Exam Increment combined with the minimum grade requirement for the Base Grades is designed to (a) promote consistency in achievement of learning objectives demonstrated across the term work and final exam, and to (b) specifically reward improvement above the level of success demonstrated on term work.

The Final Exam Increment rewards any achievement above the minimal requirement for the Base Grade. This Increment is computed as the portion of 10% proportional to your success above the minimal requirement, according to the following calculation:

\[
\frac{\text{achieved exam grade} - \text{minimum required by base grade}}{100\% - \text{minimum required by base grade}} \times 10\%
\]

For example, a student with a Base Grade of 65% who earns a 90% on the Final Exam will receive a Final Exam Increment of

\[
\frac{90\% - 85\%}{100\% - 85\%} \times 10\% = 3.33\%
\]

In situations where the exam grade is less than the minimum required exam grade dictated by the Base Grade, no increment (i.e. 0%) will be awarded. The 5% deduction to the Base Grade described at the top of this page will be applied.

Resource File Increment. Achievement on the Resource File Project can earn you up to 10%. This Resource File Increment is computed as:

\[
\frac{\text{achieved resource file grade}}{\text{total possible marks for resource file}} \times 10\%
\]

For example, if the Resource File Project is marked out of 40 points total and a group earns 33 of those points, then the Resource File Increment will be:

\[
\frac{33}{40} \times 10\% = 8.25\%
\]
**Tests Increment.** Each Test is assigned 7.5% from the total 15% allocated to the Tests Increment; for each Test, you earn a fraction of the 7.5% according to the following formula:

\[
\frac{\text{achieved grade on Test}}{\text{total possible marks for Test}} \times 7.5\%
\]

Your final Tests Increment will be the sum of the mark out of 7.5% for each of the two Tests.

**Assessment Descriptions**

There are five (5) types of Assessment used in this course. Each will be described briefly in this section; more comprehensive details, including definitions of what is required to earn credit and grading rubrics/expectations will be provided on the OWL course site.

**Assignments.**

**WHY?** The Assignments are created to demonstrate your mastery on the course-learning outcomes (see page 4 in this syllabus) in an authentic manner, including your use of the statistical software, R.

**WHAT?** There are four (4) Assignments, each composed of (typically) 2 short answer questions requiring written responses (possibly including graphs/tables and/or R code and output). The Assignments move progressively through the stages of the PPDAC framework\(^2\), and involve answering questions that relate to an overall research objective and set of related research questions.

**HOW?** The majority of the Assignments will be submitted as an R markdown file (.RMD), and resulting knitted .PDF file. Both files must be uploaded to the OWL “Assignments” tool, AND the .PDF file must be uploaded to Gradescope.ca.

**ESSENTIAL REQUIREMENT.** Completion of at least three (3) Assignments and earning at least rubric level 2 on at least 3 of the 4 Assignments is part of the ‘Essential Requirements’ to be eligible to earn credit (i.e. 50% or higher as a final course grade) for the course. Failing to meet the Essential Requirements with respect to Assignments will result in a final course grade recorded as 45% (or, your calculated course grade—whichever is lower).

**Activities.**

**WHY?** The Activities are created to promote (i) active learning of important ‘core’ course concepts, (ii) engagement with the course material, (iii) self-reflection and metacognition, and/or (iv) summarization/practice of what you are learning.

**WHAT?** There are twenty (20) Activities planned from which students can choose a subset to complete (which Activities and how many are chosen for completion depends on the Base Grade you are working towards). There are two main types of Activities: (i) 3 “Core” Activities which deal with important course concepts and require more work and critical thinking, and (ii) many other non-core Activities (typically shorter, or less challenging). The Core Activities will be labeled as such. The non-core Activities are organized into different classes (Summary, Reflection, R Practice, or Application) based on the type of exercise they involve.

**HOW?** The method of completion and submission varies depending on the particular Activity. There are, however, two main submission methods that will be used: (i) uploading to OWL “Assignments” tool and Gradescope, and (ii) as a ‘quiz’ through OWL “Tests and Quizzes” tool. The proper submission method and requirements for earning credit for an Activity will be detailed on OWL in the description of each Activity.

**ESSENTIAL REQUIREMENT.** Earning credit for at least six (6) Activities of your choice is part of the ‘Essential Requirements’ to be eligible to earn credit (i.e. 50% or higher as a final course grade) for the course. Failing to meet the Essential Requirements with respect to Activities will result in a final course grade recorded as 45% (or, your calculated course grade—whichever is lower).

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**Resource File Project.**

**WHY?** The content of this course is meant to be practical, and ideally, useful for your future courses, research, and/or jobs. One of the more valuable skills you should finish the course with is basic proficiency in using the statistical software, R. The Resource File Project provides a collaborative opportunity to bring together practical skills in R and the ‘conceptual’ course material. Creating the Resource File should also serve as a method of reviewing/studying the course material, and, ideally, will result in a reference manual that may be useful after the course has finished.

**WHAT?** As a small group (i.e. 2-4 students), you will create a document that follows the PPDAC framework for a novel dataset and research objective of your group's choosing, and demonstrates how to use the statistical software R to apply techniques (e.g. graphs, inference procedures, etc.) taught in the course. There are three (3) points in the term where parts of the Resource File Project will be due (to encourage continual work/planning towards the final project); these are referred to as ‘Phases’ for submission.

**HOW?** The Resource File Project will be submitted as an R markdown file (.RMD) and knitted to a .PDF. Both files, plus accompanying dataset (as a .CSV file), must be uploaded to the OWL “Assignments” tool, **AND** the .PDF output file must be uploaded to Gradescope.ca

**Tests.**

**WHY?** The Tests serve as low-weight opportunities to demonstrate your understanding, application, and integration of the course material.

**WHAT?** Two (2) cumulative Tests, each with a couple short answer and/or multiple choice questions, which may involve calculations. Tests are closed book unless otherwise specified in the description on OWL. Students may use non-programmable calculators.

**HOW?** Unless otherwise described on the OWL course site, the Tests will be in person, in assigned testing rooms on campus.

**Final Exam.**

**WHY?** The Final Exam serves as an opportunity to demonstrate your understanding, application, and integration of the course material, possibly including practical application of the skills/concepts with the statistical software, R.

**WHAT?** A cumulative exam with several short answer questions involving written responses as well as data analysis/interpretation. The Final Exam is closed book unless otherwise specified in the description on OWL. Students may use non-programmable calculators.

**HOW?** The Final Exam will be in person, in assigned testing rooms on campus during the Final Exam period, as scheduled by the University Registrar.

**ESSENTIAL REQUIREMENT.** Completion of the Final Exam is an ‘Essential Requirement’ to be eligible to earn credit (i.e. 50% or higher as a final course grade) for the course. Information on what will be considered ‘completion’ of the exam will be described on OWL. Failing to meet the Essential Requirements with respect to the Final Exam will result in a final course grade recorded as 45% (or, your calculated course grade—whichever is lower).

**Accommodated Evaluations**

All Assignment, Activity, and Resource File Project deadlines have an automatic 48-h ‘grace period’. That is, if you cannot make the original deadline set, you will have an additional 48-h period during which you can still submit the assessment **without** requiring any of the following: accommodation from Academic Counseling, the use of a Self-Reported Absence, or permission from the instructor. So, if you need that extra 48 hours to get these Assessments submitted, simply take it—no questions asked. Beyond that 48-h grace
period, late Activities without accommodation will not be accepted. Late Assignments or Resource File Projects will be accepted with a late penalty of at least 10% and/or 1 rubric level per 24-hour period (or part thereof). Missed assessments will not be accommodated except as described above. Note that the 48-h grace period does NOT apply to the Tests or the Final Exam.

Beyond the 48-h grace period, there are two methods to obtain accommodations (e.g. handling missed work or requiring deadline extensions) in this course: (i) Self-Reported Absences, and (ii) through Academic Counselling (i.e. submitting relevant documentation to an Academic Counsellor). How these accommodations are handled depends on the assessment item being accommodated, as described below.

- **Assignments, Resource File Project Phases**, and **Activities** all have the automatic 48-h grace period on their deadlines. Consequently, a Self-Reported Absence (SRA) will not result in any additional deadline extension or accommodation. Students unable to submit any of these items by the end of the 48-h grace period should request accommodation through Academic Counseling.

- An **Assignment** granted an extended deadline accommodation through Academic Counseling (i.e. beyond that described in the point above) should be discussed with your instructor via OWL Message to identify a suitable deadline. If the Assignment accommodation period extends beyond the point at which the graded Assignment is returned to the class, then an INC will be issued for the course grade. The missed Assignment will be completed the next time the course is offered.

- When a group member for the **Resource File Project** has been granted a deadline extension through Academic counseling, the Resource File Phase should be submitted ‘as is’ (i.e. without the accommodated student’s contributions) by the original deadline (or 48-h grace period). Then, the accommodated student’s contributions to the Project can be added later, and the ‘completed’ Project submitted to replace the initial submission.

- Self-Reported Absences or accommodation through Academic Counseling for **Test 1** will result in eligibility to write a modified version of Test 2, which incorporates the make-up for **Test 1**. Accommodation that covers the period of the make-up **Test 1** may result in a reweighting of other components of the course or some other accommodation determined as equivalent by the instructor.

- Self-Reported Absences or accommodation through Academic Counseling for **Test 2** will result in the weight of Test 2 being shifted to the Final Exam (i.e. your mark achieved on the Final Exam will be assigned as your mark achieved for Test 2). This is because of the limited time available towards the end of the course for a make-up Test 2.

- **Non-core Activities** will not be accommodated; a student missing the deadline for a non-core Activity can simply complete a different non-core Activity that is still available (i.e. with a deadline that has not yet passed). It behooves students to complete Activities throughout the term, rather than waiting until the last weeks in the course to submit Activities.

- A **core Activity** granted an extended deadline accommodation through Academic Counseling should be discussed with your instructor via OWL Message to identify a suitable deadline. If the accommodation period extends beyond the point at which the graded core Activity is returned to the class, alternative arrangements will be made to fulfill the learning outcomes of the core Activity.

Click [here](#) for a detailed and comprehensive set of policies and regulations concerning examinations and grading.

**Rounding of Marks Statement**

Across the Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. **Final grades** on this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer, e.g., 74.4 becomes 74, and 74.5 becomes 75. Marks WILL NOT be bumped to the next grade or GPA, e.g. a 79 will NOT be bumped up to an 80, an 84 WILL NOT be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark “bumping” will be (politely) denied.
Accommodation and Accessibility

Accommodation Policies
Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The Academic Accommodation for Students with Disabilities policy can be found at:
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf

Academic Consideration for Student Absence
Students who experience an extenuating circumstance (illness, injury or other extenuating circumstance) sufficiently significant to temporarily render them unable to meet academic requirements may submit a request for academic consideration through the following routes:

(i) Submitting a Self-Reported Absence (SRA) form provided that the conditions for submission are met.
   To be eligible for a Self-Reported Absence:
   • an absence must be no more than 48 hours
   • the assessments must be worth no more than 30% of the student’s final grade
   • no more than two SRAs may be submitted during the Fall/Winter term
(ii) For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner to the Academic Counselling office of their Faculty of Registration.
(iii) Submitting appropriate documentation for non-medical absences to the Academic Counselling office in their Faculty of Registration.

Note that in all cases, students are required to contact their instructors within 24 hours of the end of the period covered, unless otherwise instructed in the course outline. For 2244: when submitting a Self-Reported Absence, please do NOT send a follow-up email. Instructions on how to manage Self-Reported Absences will be communicated in advance of all deadlines; simply follow those instructions.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student’s Home Faculty.

For the policy on Academic Consideration for Student Absences – Undergraduate Students in First Entry Programs, see:
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf
and for the Student Medical Certificate (SMC), see:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

Religious Accommodation
Students should consult the University’s list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the Western Multicultural Calendar: https://multiculturalcalendar.com/ecal/index.php?s=c-univwo

Absences from Final Examinations
If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course
load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under Special Examinations).

Academic Policies

The website for Registrarial Services is http://www.registrar.uwo.ca.

In accordance with policy, https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf, the centrally administered e-mail account provided to students will be considered the individual’s official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

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_undergrad.pdf.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (http://www.turnitin.com).

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Personal response devices (“clickers”) may be used in this course for the purpose of engagement during in-person learning and/or to provide informal feedback to your instructor about student understanding. Clicker use will not contribute to course grades. Any personal data collected (e.g. student usernames/identification and responses to clicker questions) will be treated like other confidential course-related data.

Professionalism & Privacy
Western students are expected to follow the Student Code of Conduct. Additionally, the following expectations and professional conduct apply to this course:

✓ Students are expected to follow online etiquette expectations provided on OWL
✓ All course materials created by the instructor(s) are copyrighted and cannot be sold/shared
✓ Recordings are not permitted (audio or video) without explicit permission
✓ Permitted recordings are not to be distributed
✓ Students will be expected to take an academic integrity pledge before some assessments
✓ All recorded sessions will remain within the course site or unlisted if streamed

Some of the remote learning sessions for this course may be recorded.
The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals participating in the course for their private or group study purposes. Please contact the instructor if you have any concerns related to session recordings.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.
Copyright Statement
Please be aware that all course materials created by the instructor(s) are copyrighted and cannot be sold/shared. Those include materials used in tests/quizzes, assignments, midterms, activities, and finals. Any posting/sharing of such materials in part or whole without owner’s consent is considered as violation of the Copyright Act and will be considered as a scholastic offence.

In addition, online services such as Chegg are actively monitored. Any questions that are coming out during midterms and finals and are posted to an online service will be searched. Such an activity will be considered as a scholastic offence and will result in academic penalty.

Support Services

Please visit the Science Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: https://www.uwo.ca/sci/counselling/

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessibility Services (SAS) at (519) 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: https://www.uwo.ca/se/digital/

Learning-skills counsellors at the Student Development Centre (http://www.sdc.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, http://westernusc.ca/services.