THE UNIVERSITY OF BRITISH COLUMBIA

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# STAT 305
# 2021/2022, Term 2
# Instructor: Benjamin Bloem-Reddy

**Description:** Review of probability theory. Sampling distribution theory, large sample theory and methods of estimation and hypothesis testing, including maximum likelihood estimation, likelihood ratio testing and confidence interval construction. [3-0-1]

**Prerequisites**: Either (a) one of STAT 200, STAT 203, BIOL 300, STAT 241, STAT 251, COMM 291, ECON 325, FRST 231, PSYC 218, PSYC 366, and one of MATH 302, STAT 302; or (b) a score of 65% or higher in one of MATH 302, STAT 302. The Department recommends that students meet the prerequisite through option (a).

**Textbook/course material:** "STAT 305, Introduction to Statistics Inference" by Welch, W.J. (August 14, 2019 edition).   A physical copy may be purchased from the bookstore.

**References:** "Mathematical Statistics and Data Analysis: (3rd edition) by Rice, J.A.

**Website:** canvas.ubc.ca

**Classes:** will be offered at the scheduled time MWF 4:00 – 5:00.  Each class will have iClicker Cloud questions, which must be answered during the class time.

**Assessment:**  Three quizzes 40%, final exam 35%, assignments (including WeBWorK, some written components and/or labs) 20%, in-class iClicker questions 5%.

To pass the course it is normally necessary to obtain 50% based on the quizzes and final examinations, i.e., 37.5 or more out of the maximum of 75 percentage points. Otherwise the exam grade is normally reported. If the 50% exam threshold is satisfied, the grade reported is weighted based on all assessment components above.

**Policy regarding missing the final exam:** Students who miss the final exam must report to their Faculty advising office within 72 hours of the missed exam, and must supply supporting documentation. Only your Faculty Advising office can grant deferred standing in a course. You must also notify your instructor prior to (if possible) or immediately after the missed exam. Your instructor will let you know when you are expected to write your deferred exam. Deferred exams will ONLY be provided to students who have applied for and received deferred standing from their Faculty. Please note that if you are granted deferred standing for the STAT 305 final exam in term 1, you will be expected to write your deferred exam with the term 2 sitting of the course in April. In such a case, make sure that you download the class notes from Canvas immediately, because you will not have access to them after December 31st.

**Quizzes**: Quizzes will be held in the 4:00 – 5:00 pm classes (no alternate times those days or other days) on the following dates: Feb. 14th, Mar. 7th, and Mar. 25th. They will start at the beginning of class, so please make sure you are on time. Quizzes will be based on all course materials, including graded assignments, other ungraded problems assigned from time to time, lectures, and activities held in lectures.

There will be no make-up quizzes. If you miss a quiz for a documented valid reason, the weights for the other quizzes and the final will be readjusted to total 75% (the quizzes and final make up 75% of the grading scheme).

Please make your student ID available at the quizzes and final exam.

**Assignments**: There will be approximately weekly online assignments for credit based on WeBWorK. There will also be a written component (possibly in the form of a lab) to be uploaded to Gradescope.

Additional practice questions will also be suggested approximately weekly.  They will NOT be collected or marked. Brief answers are often in the course text, and some answers may be taken up in office hours. No other solutions will be provided.  If you cannot get started with a question or are stuck at some point in the solution, please see one of the teaching team during office hours. We are here to help YOU successfully complete the problem; if does not help you if we do the problem for you. See us as often as you need to keep making progress. Working together in groups for these questions is allowed and indeed encouraged.  One purpose of all assignments is to prepare you for the quizzes and final, where similar questions will appear. The suggested questions are not part of assessment but are also an (essential!) aid to learning by doing.

**Computing**: Computing is an integral part of this course, e.g., to compute required probabilities. We will use the R data-analysis environment. The course website has information about how you may access R on your own computer, data sets and examples, and several online R tutorials, including a "getting started guide". Many of the assigned questions will involve computing. Familiarity with R will also be tested on the quizzes and final examination.

**Outline of topics:** The course will start with a quick review of some relevant topics from probability, after which we will learn the fundamental concepts and tools for thinking like a statistical scientist: statistical modeling, estimation, maximum likelihood, frequentist confidence intervals, Bayesian inference, hypothesis testing, and applications to categorical data.