

**FACULTY OF SCIENCE**

**STAT2010U: Statistics & Probability for Physical Science**

**Course outline for Fall, 2017**

**1. Course Details & Important Dates\***

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| Course Type | CRN | Day | Time | Location |
| Lecture | 40410 | Tuesday  Thursday | 6:40-8:00 pm  6:40-8:00 pm | UA1120  UA1120 |

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| Classes Start | Classes End | Final Exam Period |
| Sept 7, 2017 | Dec 4, 2017 | Dec 6 – 17, 2017 |

**See below “Outline of Topics in this Course” for a detailed week by week breakdown of in class lectures.**

\* for other important dates go to: [www.uoit.ca](http://www.uoit.ca) >Current Students >Important Dates and Deadlines

**2. Instructor Contact Information**

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| Instructor Name | Office | Phone | Email |
| Isaac Ye (section 001) | UA2021 | Ext. 2825 | Please use Blackboard E-mail |
| Office Hours: Tuesday’s from 2:00-3:30pm, Thursday’s from 2:00-3:30pm in UA2021. | | | |

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| Grader/Teaching Assistant Name | Office | Phone | Email |
| Ruth (Qing Hong) Li | UA4120 | N/A | Please use Blackboard E-mail |
| Office Hours: Tuesday’s from 11:00 am-12:00pm in UA4120. | | | |

**3. Course Description**

| This course introduces the concepts and techniques of statistics and probability to collect, present, analyze and interpret data, and make decisions in the presence of variability. Students study a selection of topics relevant to biological science, selected from: basic concepts of probability theory: events, sample spaces, probability; basic concepts of discrete mathematics: set theory, propositional logic, combinatorics; probability: marginal probability, conditional probability, independence, discrete and continuous random variables; probability distributions: binomial, exponential, uniform, normal, etc.; mean and variance; the central limit theorem; statistical inference: estimation, significance tests, confidence intervals; One way ANOVA; introduction to experimental design. Introduction to correlation and regression. |
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**4. Learning Outcomes**

| On the successful completion of the course, students will be able to:  Describe, interpret and analyze data. Calculate summary statistics such as central tendencies, dispersion, quartiles and percentiles. Graphically display data using histograms, stem-and-leaf plots and boxplots. Describe shape and skewness of data. Compute the probability of an event, marginal, joint and conditional probabilities. Describe the concept of random variables, and setting up a discrete mass function. Identify a variety of probability distributions, both discrete and continuous and the ability to calculate various probabilities, and distribution summary statistics. Computing confidence intervals for both large and small sample sizes based on a single mean. Distinguish between independent, paired or pooled data and calculating confidence intervals based on the difference between two means. Write a testable hypothesis and explain the difference between the null and alternative hypothesis. Define statistical significance and explain the meaning of a p-value. Carry out a hypothesis test for univariate (large and small sample size), bivariate data (independent, paired or pooled) and multivariate data. Describe the purpose and calculate Pearson Correlation Coefficient as well as the least squares line and goodness of fit. Applying all learning outcomes stated above in SAS (statistical analysis system). |
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**5. Course Design**

| Each week you will have two 1.5 hour lectures. A total of 6 online timed quizzes (in Maple T.A.) will be completed throughout the duration of the course, consisting of 10 multiple choice/true false/fill in the blank questions (see below “Assignment and Tests” to view a detailed breakdown of quiz dates). Throughout the course, you will be completing 5 assignments based on the material taught throughout the course. Pop quizzes in lecture and weekly online quizzes will allow for practice and feedback. SAS software will be used near the end of the semester in lectures, quizzes and assignments. One midterm and 1 final exam. |
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**6. Outline of Topics in the Course**

| ***Week 1 (Sept 7-8)****Chapter 1: Data and Distributions*    - Data, Populations and Samples (Section 1.1); - Histograms and Stem and Leaf Plots (Section 1.2).  ***Week 2 (Sept 11-15)*** *Chapter 1: Data and Distributions*  - Histograms and Stem and Leaf Plots – Cont’d (Section 1.2);  - Continuous Distributions (Section 1.3).  - Discrete Distributions – Cont’d (Section 1.3).  ***Week 3 (Sept 18-22)***  *Chapter 1: Data and Distributions & Chapter 2: Measures of Center*  - Standard Normal and Nonstandard Normal Distribution (Section 1.4).  - Binomial Distribution (Section 1.6);- Measures of Center for Data and Distributions (Section 2.1).  ***Week 4 (Sept 25-29)***  *Chapter 2: Measures of Center*  - The Mean and Median of Continuous Distributions (Section 2.1);- Measures of Variability (Section 2.2). - Quartiles and the Interquartile Range, Boxplots and outliers (Section 2.3).  ***Week 5 (Oct 2-6)*** *Chapter 3: Bivariate and Multivariate Data and Distributions*  - Bivariate Data (Section 3.1); - Correlation, Pearson’s Sample Correlation Coefficient and Causation (Section 3.2);- Fitting a line to Bivariate Data (Section 3.3).  - The Least Squares Regression Line and Assessing the Fit of the Least Squares Line (Section 3.3);  - Plotting the Residuals (Section 3.3).  ***Week 6 (Oct 9-13)***  *Chapter 5: Probability and Sampling Distributions*  - Probability, sampling space and events (Section 5.1); - Operations on Events and Associated Rules of Probability (Section 5.2).  - Conditional Probability and Independence (Section 5.3); - Random Variables and Probability Distributions (Section 5.4). |
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**6. Outline of Topics in the Course cont…**

| ***Week 7* (Oct 16-20)**  *Chapter 5: Probability and Sampling Distributions*  - Mean and Variance of a Random Variable (Section 5.4);- Sampling Distributions (Section 5.5);  - The Mean, Variance and Standard Deviation of the Sample Mean (Section 5.6).  - The Central Limit Theorem, empirical rule and continuity correction (Section 5.6).  ***Week 8 (Oct 23-27)***  *Chapter 7: Estimation and Statistical Intervals*  - Large-Sample Confidence Intervals for a Population Mean (Section 7.2);  - 95% Confidence Interval, Other Confidence Levels and a General Formula and Sample Size Formula (Section 7.2).  No lecture during Co-curricular period (No lecture on Thursday, Oct 26)  ***Week 9 (Oct 30- Nov 3)***  *Chapter 7: Estimation and Statistical Intervals and Midterm*  - Large-Sample One sided Confidence Intervals (Section 7.2);  - Large-Sample Confidence Intervals for a Population Proportion and Sample Size Formula (Section 7.3);  - The t-Distribution and Small-Sample t Confidence Interval (Section 7.4).  **MIDTERM IN CLASS ON THURSDAY, NOV 2**  ***Week 10 (Nov 6-10)***  *Chapter 7: Estimation and Statistical Intervals & Chapter 8: Testing Statistical Hypotheses*  - The t-Distribution and Small-Sample t Confidence Interval – Cont’d (Section 7.4); - Hypothesis Testing, Type I and Type II Error and p-values (Section 8.1).  - Hypothesis Testing, Type I and Type II Error and p-values – Cont’d (Section 8.1);  - Tests Concerning a Single Mean (Section 8.2).  ***Week 11 (Nov 13-17)***  *Chapter 8: Testing Statistical Hypotheses*  - Tests Concerning a Single Mean – Cont’d (Section 8.2);  - Tests Concerning a Difference Between Two Means: Paired Data (Section 8.2).  - Tests Concerning a Difference Between Two Means: Independent Data (Section 8.2);  - The Pooled Two-Sample t Procedure (Section 8.2). |
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**6. Outline of Topics in the Course cont…**

| ***Week 12 (Nov 20-24)***  *Chapter 8: Testing Statistical Hypotheses*  - The Pooled Two-Sample t Procedure – Cont’d (Section 8.2);  - Review of all hypothesis procedures;  - ANOVA terminology and Concepts (Section 9.1).  - Single Factor ANOVA (Section 9.2).  ***Week 13 (Nov 27- Dec 1)***  *SAS Statistical Program*  - Introductory to SAS;  - Understanding the Basic Concepts of SAS;  - Univariate analysis in SAS (histogram/boxplot/stem and leaf), Correlation and Regression in SAS, Single Mean Hypothesis in SAS.  - Understanding How to Read SAS output;  - Ability to interpret SAS output;  - Paired/Independent/Pooled Hypothesis and Confidence intervals in SAS, ANOVA in SAS. |
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**7. Required Texts/Readings**

| **REQUIRED:**  *Applied Statistics FOR ENGINEERS AND SCIENTISTS, Devore – Farnum - Doi, Third Edition, CENGAGE Learning Nelson Education, 2014. ISBN* 113311136X*.*  **RECOMMENDED/OPTIONAL:**  *Student Solutions Manual For Devore – Farnum - Doi 3rd ed. Applied Statistics for Engineers and Scientists. 2014. ISBN* 1133492185.  The text and solution manual is available on reserve (3 hr) at the library…just visit the reserve desk (on the left when you first enter the library) and ask for STAT2010.  *Additional readings may be assigned or recommended during the course.* |
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**8. Evaluation Method**

| The course mark will be calculated as follows:  Online quizzes: 10%  In lecture pop quizzes: 10%  Assignments: 10%  Midterm: 30% **(Thursday, November 2 – in class)**  Final Exam: 40%  *Final course grades may be adjusted to conform to program or Faculty grade distribution profiles. Further information on grading can be found in Section 5 of the UOIT Academic Calendar.* |
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**9. Assignments and Tests**

| **Online Quizzes:** Online quizzes will be completed in MapleTA and are to be completed individually. There will be 6 online quizzes throughout this course. Your lowest quiz will be dropped. Quizzes will consist of 10 multiple choice/fill in the blank questions and you will have 30 minutes to complete each quiz. Each quiz will be made available for 3 days, and you have TWO attempts at each quiz. Your best attempt counts. The quiz schedule is as follows:  Quiz 1 – covers lectures 1, 2, 3 and 4. Must be taken sometime between 8pm Friday September 22 and 8pm Monday September 25.  Quiz 2 – covers lectures 5, 6 and 7. Must be taken sometime between 8pm Friday September 29 and 8pm Monday October 2.  Quiz 3 – covers lectures 8 and 9. Must be taken sometime between 8pm Friday October 6 and 8pm Tuesday October 10. \*Note the extra day due to Thanksgiving.  Quiz 4 – covers lectures 10, 11, 12 and 13. Must be taken sometime between 8pm Friday October 20 and 8pm Monday October 23.  Quiz 5 – covers lectures 14, 15, 16, 17, 18 and 19. Must be taken sometime between 8pm Friday November 17 and 8pm Monday November 20.  Quiz 6 – covers lectures 20, 21, 22 and 23. Must be taken sometime between 8pm Friday December 1 and 8pm Monday December 4.  **Pop Quizzes In lecture:** These short quizzes will take place using Blackboard software and must be  completed in your lecture section. They will not be announced in advance, and can occur at any point during the lecture. The lowest *three* will not count towards your final grade. |
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**9. Assignments and Tests cont…**

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| **Assignments:**  Assignments are to be completed individually. There will be 5 assignments throughout this course. Your lowest assignment will be dropped. Your assignments are to be submitted to your Grader/Teaching Assistant’s drop box (Ruth Li) located on the 4th floor of the UA building. Be sure to submit your assignment on time and to the correct drop box. Late assignments are not accepted in this course. Assignments submitted into the incorrect drop box are not accepted in this course. Your drop box is labelled **Ruth Li – STAT 2010.** Here is the assignment schedule:  -Assignment 1 is posted on Friday, Sept 8 and is due on Thursday, Sept 21  at 6:00pm in Ruth Li’s drop box  -Assignment 2 is posted on Friday, Sept 22 and is due on Thursday, Oct 5  at 6:00pm in Ruth Li’s drop box  -Assignment 3 is posted on Friday, Oct 6 and is due on Thursday, Oct 19 at  6:00pm in Ruth Li’s drop box  -Assignment 4 is posted on Friday, Oct 20 and is due on Thursday, Nov 9  at 6:00pm in Ruth Li’s drop box  -Assignment 5 is posted on Friday, Nov 10 and is due on Thursday, Nov 30  at 6:00pm in Ruth Li’s drop box  **NOTE: Regarding missed work:**   * **If you miss an online quiz, in lecture quiz or an assignment, then you receive a 0 on it. We recognize that times may arise when you are forced to miss a quiz/lecture/assignment, but it is for this very reason that the single lowest online quiz mark, three lowest in lecture pop quizzes and the single lowest assignment mark is dropped. This is extremely generous, so no notes will be accepted for missed quizzes and/or assignments. This policy applies to all students.**   **Midterm Tests and Final Exam**:  A non-programmable, non-graphing, scientific calculator is permitted. Laptops will NOT be permitted during the midterm test and final exam. The final exam will test all material covered in the course. You will be provided a formula sheet for both the midterm and the final exam. |

**9. Assignments and Tests cont…**

| **Missed Tests (Midterm or Final Exam):**  The normal policy on missed (midterm and other) tests is as follows: If you miss a test for a legitimate reason and can provide appropriate documentation, you will not be penalized. Legitimate reasons are illness or death in the family, and appropriate documentation is a UOIT Medical Certificate or a photocopy of a death certificate, respectively. You should submit documentation to the student advisor in science, within 3 days of missing the test.  If you are not able to do so for any reason, you must contact the academic advisor (via email if at all possible at [science.advising@uoit.ca](https://email.uoit.ca/owa/redir.aspx?C=00e55715ed7648ee85833e87a9e9b94b&URL=mailto%3ascience.advising%40uoit.ca) ) within this time to make other arrangements.  The usual accommodation for a missed midterm test will be to re-weight the grading scheme to allocate the missed test mark to the final exam mark.  If you miss a test without a legitimate reason or do not provide the proper documentation, you will receive a mark of zero. If the test is written, the decision is irreversible.  If you are contemplating not writing a test for any reason, please speak to the science academic advisor in advance of the test, as well as informing the instructor.  For further policies and information relating to the Faculty of Science and this course, please refer to <http://www.science.uoit.ca/undergraduate/current-students/academic-policies.php> (copy and paste into your browser)  You can also find the answers to many frequently asked advising questions by  referring to <http://www.science.uoit.ca/undergraduate/current-students/academic-advising/faqs/> (copy and paste into your browser) |
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**10. Accessibility**

| Students with disabilities may request to be considered for formal academic accommodation in accordance with the Ontario Human Rights Code. Students seeking accommodation must make their requests through Student Accessibility Services. Requests must be made in a timely manner, and students must provide relevant and recent documentation to verify the effect of their disability and to allow the university to determine appropriate accommodations.  Accommodation decisions will be made in accordance with the Ontario Human Rights Code. Accommodations will be consistent with and supportive of the essential requirements of courses and programs, and provided in a way that respects the dignity of students with disabilities and encourages integration and equality of opportunity. Reasonable academic accommodation may require instructors to exercise creativity and flexibility in responding to the needs of students with disabilities while maintaining academic integrity. |
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**11. Academic Integrity**

| Students and faculty at UOIT share an important responsibility to maintain the integrity of the teaching and learning relationship. This relationship is characterized by honesty, fairness and mutual respect for the aim and principles of the pursuit of education. Academic misconduct impedes the activities of the university community and is punishable by appropriate disciplinary action.  Students are expected to be familiar with and abide by UOIT’s regulations on Academic Conduct (Section 5.15 of the Academic Calendar) which sets out the kinds of actions that constitute academic misconduct, including plagiarism, copying or allowing one’s own work to copied, use of unauthorized aids in examinations and tests, submitting work prepared in collaboration with another student when such collaboration has not been authorized, among other academic offences. The regulations also describe the procedures for dealing with allegations, and the sanctions for any finding of academic misconduct, which can range from a resubmission of work to a failing grade to permanent expulsion from the university. A lack of familiarity with UOIT’s regulations on academic conduct does not constitute a defense against its application.  Further information about academic misconduct can be found in the Academic Integrity link on your laptop. Extra support services are available to all UOIT students in academic development, study skills, counseling, and peer mentorship. More information on student support services can be found in the Academic Calendar (Section 8). |
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**12. Final Examinations**

| Final examinations are held during the final examination period at the end of the semester and may take place in a different room and on a different day from the regularly scheduled class. Check the published Examination Schedule for a complete list of days and times.  Students are advised to obtain their Student ID Card well in advance of the examination period as they will not be able to write their examinations without it. Student ID cards can be obtained at the Campus ID Services, in G1004 in the Campus Recreation and Wellness Centre.  Students who are unable to write a final examination when scheduled due to religious publications may make arrangements to write a deferred examination. These students are required to submit a Request for Accommodation for Religious Obligations to the Faculty concerned as soon as possible and no later than three week prior to the first day of the final examination period.  Further information on final examinations can be found in Section 5.24 of the Academic Calendar. |
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**13. Freedom of Information and Protection of Information Act**

| The following is an important notice regarding the process for submitting course assignments, quizzes and other evaluative material in your courses in the Faculty of Science.  As you may know, UOIT is governed by the *Freedom of Information and Protection of Information Act* (“FIPPA”).  In addition to providing a mechanism for requesting records held by the university, this legislation also requires that UOIT not disclose the personal information of its students without their consent.  FIPPA’s definition of “personal information” includes, among other things, documents that contain both your name and your Banner ID. For example, this could include graded test papers or assignments. To ensure that your rights to privacy are protected, the Faculty of Science encourages you to use only your Banner ID on assignments or test papers being submitted for grading. This policy is intended to prevent the inadvertent disclosure of your information where graded papers are returned to groups of students at the same time. If you still wish to write both your name and your Banner ID on your tests and assignments, please be advised that UOIT will interpret this as an implied consent to the disclosure of your personal information in the normal course of returning graded materials to students. If you have any questions or concerns relating to the new policy or the issue of implied consent addressed above, please contact the UOIT Chief Privacy Officer at [accessandprivacy@uoit.ca](https://email.uoit.ca/owa/redir.aspx?C=pu20xyMQUkCVdb9OSDOJTdSgX-6Si9FIULEUb4tEsqHxxKbZNcwaKruN8518T8ROd2QWy2v4YdI.&URL=mailto%3aaccessandprivacy%40uoit.ca). |
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**14. Course Evaluations**

| Student evaluation of teaching is a highly valued and helpful mechanism for monitoring the quality of UOIT’s programs and instructional effectiveness. To that end, course evaluations are administered by an external company in an online, anonymous process during the last few weeks of classes. Students are encouraged to participate actively in this process and will be notified of the dates. Notifications about course evaluations will be sent via e-mail, and posted on Blackboard, Weekly News and signage around the campus. |
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**15. Student Sexual Violence Policy**

| UOIT is committed to the prevention of sexual violence in all its forms. For any UOIT student who has experienced Sexual Violence, **UOIT can help**. UOIT will make accommodations to cater to the diverse backgrounds, cultures, and identities of students when dealing with individual cases.  If you think you have been subjected to or witnessed sexual violence:   * + Reach out to a Support Worker, who are specially trained individuals authorized to receive confidential disclosures about incidents of sexual violence. Support Workers can offer help and resolutions options which can include safety plans, accommodations, mental health support, and more. To make an appointment with a Support Worker, call 905.721.3392 or email [supportworker@uoit.ca](mailto:supportworker@uoit.ca)   + Learn more about your options at: [www.uoit.ca/sexualviolence](http://www.uoit.ca/sexualviolence) |
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**16. Additional Supports**

| Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact [studentlife@uoit.ca](mailto:studentlife@uoit.ca) for support. |
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