# Math 3680.001: Spring 2015

**Meets**: TR 12:30-1:50 in Sage Hall, Room 330

**Instructor**: Professor John Quintanilla

**Main Office**: GAB, Room 418-D

**Office Phone**: x4043

**Secondary Office**: Wooten Hall, Room 335

**Secondary Office Phone**: x4235

**E-mail**: There are three ways to reach me by e-mail.

1. My usual e-mail address: jquintanilla@unt.edu.
2. Through Enhanced Webassign: click **Communication** near the top of the Enhanced WebAssign page and then follow the prompts.
3. Through Enhanced WebAssign: when doing your homework, click **Ask Your Teacher** near the top of the Enhanced WebAssign page and then follow the prompts. **If you have a question about a specific homework problem, this is perhaps the best way to communicate with me**, as I can see both your message and your previous attempts at doing your homework.

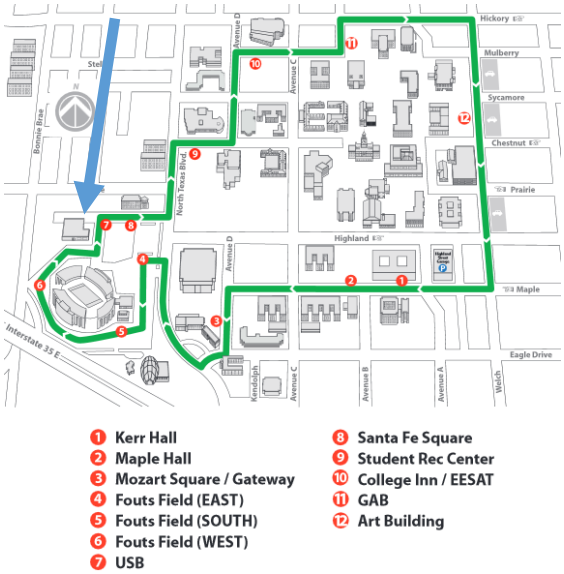
**Web page**: http://www.math.unt.edu/~johnq/Courses/2015spring/3680/

**Office Hours**:

- Wooten Hall office: Wednesdays and Fridays, 8-9:30
- Main GAB office: Tuesdays 10-12, Thursdays 10-12, or by appointment. I'm fairly easy to find, and you're welcome to drop by outside of office hours without an appointment. However, there will be occasions when I'll be busy, and I may ask you to wait or come back later.

**Required Text**: *Probability & Statistics for Engineering and the Sciences*, by J. L. Devore. There are two options for purchasing this text. The second option is cheaper; however, this only provides temporary online access to the textbook, so that you would neither be able to use a physical hard copy of the book this semester nor permanently add it to your bookshelf after completing the course.

- Bundle: Text + Enhanced WebAssign + Start Smart Guide for Students + Enhanced WebAssign Homework with eBook Printed Access Card for One Term Math and Science. ISBN 978-1-111-65549-5. Can be purchased for $191.49 from www.cengagebrain.com. Can also be purchased at the UNT Bookstore (price not available at this time).
- Book + Enhanced WebAssign. ISBN 978-1-285-85804-3. Can be purchased for $75 from www.cengagebrain.com.




**Strongly Recommended**: Lecture notes for the semester can be purchased from the Eagle Images Print Center for approximately $20. The Eagle Images Print Center is in room 124 of the University Service Building (USB), which located near the Fouts Field Parking Lot. This is not a convenient location, but offering them for sale elsewhere would increased the price of the lecture notes significantly. The Mean Green (stop 7 on the map) and Campus Cruiser shuttles both stop at USB. You should enter through the north door (that is, the door that isn't facing Fouts Field) to easily get to the Print Center.

**Technology**: You will be expected to bring to class --- including exams --- either a laptop computer with a spreadsheet program (such as Microsoft Excel or Open Office Calc) or else a calculator that can perform multiple statistical functions. In class, I will demonstrate how to use Microsoft Excel and a TI-83 Plus to perform various statistical functions. If you have some other kind of calculator, you are welcome to ask me before or after class about how to use its statistical functions.

**Course Description**: Descriptive statistics, elements of probability, random variables, confidence intervals, hypothesis testing, regression, contingency tables.

**Prerequisite**: Math 1710 and Math 1720 (may be taken concurrently).

---

# What You Should Do Immediately

Please read the Enhanced WebAssign handout for instructions about how to enroll yourself in the appropriate section of Math 3680. In particular, you will need to visit www.webassign.net and use the following Class Key Code: unt 6709 6156

Click here for further instructions about getting started with Enhanced WebAssign.

I strongly encourage you to get started with Enhanced WebAssign as soon as possible. If you delay, you run the risk of unforeseen technical problems that could prevent you from completing the first assignments (both due on Friday, January 30) , with a bonus possible if submitted by September 3).

While Enhanced WebAssign is required for the course, it is my understanding that, at the start of the semester, you have a 14-day grace period to use Enhanced WebAssign for free. After this grace period, a code must be entered to continue to use Enhanced WebAssign.

---

# Course Topics

The following chapters and sections of the textbook will be covered according to the projected schedule below. Dates may change as events warrant.

- Chapter 1: Overview and Description Statistics
  - 1.1 Populations, Samples and Processes
  - 1.2 Pictorial and Tabular Methods in Descriptive Statistics
  - 1.3 Measures of Location
  - 1.4 Measures of Variability
- Chapter 2: Probability
  - 2.1 Sample Spaces and Events
  - 2.2 Axioms, Interpretations, and Properties of Probability
  - 2.4 Conditional Probability
  - 2.5 Independence
- Chapter 3: Discrete Random Variables and Probability Distributions
  - 3.1 Random Variables
  - 3.2 Probability Distributions for Random Variables
  - 3.3 Expected Values
  - 3.4 The Binomial Probability Distribution
  - 3.5 Hypergeometric and Negative Binomial Distributions
- Chapter 4: Continuous Random Variables of Probability Distributions
  - 4.1 Probability Density Functions
  - 4.2 Cumulative Distribution Functions and Expected Values
  - 4.3 The Normal Distribution
  - 4.6 Probability Plots
- Chapter 5: Joint Probability Distributions and Random Samples
  - 5.4 The Distribution of the Sample Mean
  - 5.5 The Distribution of a Linear Combination
- Chapter 7: Statistical Intervals Based on a Single Sample
  - 7.1 Basic Properties of Confidence Intervals
  - 7.2 Large-Sample Confidence Intervals for a Population Mean and Proportion
  - 7.3 Intervals Based on a Normal Population Distribution
- Chapter 8: Test of Hypotheses Based on a Single Sample
  - 8.1 Hypotheses and Test Procedures
  - 8.2 Tests About a Population Mean
  - 8.3 Tests Concerning a Population Proportion
  - 8.4 *P*-Values
- Chapter 9: Inferences Based on Two Samples
  - 9.1 *z* Tests and Confidence Intervals for a Difference Between Two Population Means
  - 9.2 The Two Sample t Test and Confidence Interval
  - 9.3 Analysis of Paired Data
  - 9.4 Inferences Concerning a Difference Between Population Proportions
- Chapter 12: Simple Linear Regression
  - 12.2 Estimating Model Parameters
  - 12.5 Correlation
- Chapter 13: Nonlinear and Multiple Regression
  - 13.2 Regression with Transformed Variables
- Chapter 14: Goodness-of-Fit Tests and Categorical Data Analysis
  - 14.1 Goodness-of-Fit Tests When Category Probabilities Are Completely Specified
  - 14.3 Two-Way Contingency Tables

| | | | | |
|---|---|---|---|---|
| **January 20** | Lecture #1 | 1.2, 1.3 | Graphical Representation of Data | Page 3: Box and Whisker Plots |
| **January 22** | Lecture #1 | 1.3, 1.4 | Graphical Representation of Data | Page 7: Histograms |
| **January 27** | Lecture #2 | 1.3, 1.4 | Mean and Standard Deviation | Pages 2-3: Trimmed Means<br>Page 5: Mean and SD |
| **January 29** | Lecture #3 | 2.2, 2.4 | Probability: Axioms and Multiplication Rule | Page 2: Probability<br>Page 5: Multiplication Rule<br>Page 7: Tree Diagram |

| | | | | |
|---|---|---|---|---|
| **February 3** | Lecture #4 | 2.2, 2.5 | Probability: Independence and Addition Rule | Page 2: Independence<br>Page 3A: Multiplication Rule<br>Page 3B: Parallel/Series<br>Page 8A: Deck of Cards<br>Page 8B: Venn Diagram<br>Page 9: Venn Diagram |
| **Feburary 5** | Lecture #5 | 3.1, 3.2, 3.3 | Discrete Random Variables and Probability Distributions | Page 2: Cumulative Distribution Function<br>Page 5: Mean and SD |
| **February 10** | Lecture #6 | 3.4, 3.5 | Binomial and Hypergeometric Distributions | Pages 5-6: Binomial<br>Page 9: Hypergeometric |
| **February 12** | Lecture #7 | 4.1, 4.2 | Continuous Random Variables | Page 2: Probability and Cumulative Distribution Function<br>Page 3: Percentile<br>Page 5: Mean and SD |
| **February 17** | Lecture #8 | 4.3 | The Normal Distribution | Page 4: Probability<br>Page 5: Percentile |
| **February 19** | **Exam #1** | Chapters 1-3<br><br>Lectures 1-6 | Review #1 | The videos below give the solutions to each of the review exercises. I encourage you to attempt each problem on your own before watching the videos.<br><br>1.1 1.2 1.3 1.4 1.5 1.6,7,8 1.9,10,11 1.12,13 1.14 1.15 |
| **Feburary 24** | Lecture #9 | 4.3, 5.4 | Approximating Bin(n,p) with the Normal Distribution | Page 4: Normal Approximation of Binomial Distribution |
| **February 26** | Lecture #10 | 4.6, 5.5 | Probability Plots and Linear Combinations of Random Variables | Page 2: Probability Plot |
| **March 3** | Lecture #11 | 5.4 | The Central Limit Theorem | Page 6: Estimating Probability Involving a Sum |
| **March 5** | Lecture #12 | 7.1, 7.2 | Confidence Intervals: Large samples or known $\sigma$ | Page 7: Two-Sided Confidence Interval for a Population Mean |
| **March 10** | Lecture #13 | 7.2 | Confidence Intervals: One-Sided for Means and Two-Sided for Proportions | Page 3: One-Sided Confidence Interval for a Population Mean<br>Page 6: Two-Sided Confidence Interval for a Proportion |
| **March 12** | Lecture #14 | 7.3 | Confidence Intervals and Prediction Intervals: Small Samples | Page 3: *t* Distribution<br>Page 5: Two-Sided Confidence Interval for a Population Mean (Small Sample)<br>Page 7: Prediction Interval |
| **SPRING BREAK** | | | | |
| **March 24** | Lecture #15 | 8.1 | Introduction to Hypothesis Testing | *To be added later* |
| **March 26** | **Exam #2** | Chapters 4-7 | Review #2 | The videos below give the solutions to each of the review |

| | | | | |
|---|---|---|---|---|
| | | Lectures 7-14 | | exercises. I encourage you to attempt each problem on your own before watching the videos.<br><br>2.1 2.2 2.3 2.4 2.5<br>2.6 2.7 2.8 2.9 2.10<br>2.11 2.12 2.13 2.14-15<br>2.16 2.17<br><br>Note: In 2.11, I discuss how to find critical values for the *t* distribution using a table. |
| **March 31** | Lecture #16 | 8.2 | Hypothesis Testing: The z-Test | Page 1: Right-tailed z-Test<br>Page 7: Type II Error<br>Page 9: Sample size for a given value of β |
| **April 2** | Lecture #17 | 8.2 | Hypothesis Testing: The z-Test and t-Test | Page 1: Left-tailed z-Test<br>Page 2: Type II Error and Sample Size<br>Page 4: Two-tailed z-Test<br>Page 6: Right-tailed t-Test<br>Page 9: Two-tailed t-Test |
| **April 7** | Lecture #18 | 8.3 | Hypothesis Testing: The z-Test and Proportions | Pages 4-5: Right-tailed z-Test for a Proportion, Type II Error, and Sample Size |
| **April 9** | Lecture #19 | 8.4 | *P*-values | Page 1: Right-tailed z-Test<br>Page 5: Left-tailed t-Test |
| **April 14** | Lecture #20 | 9.1 | Two-Sample Data: Unpaired Large Samples | Pages 1 and 5: Hypothesis test for the difference in the averages of two large samples<br>Page 6: Confidence intervals for the difference in the averages of two large samples |
| **April 16** | Lecture #21 | 9.2, 9.3, 9.4 | Two-Sample Data: Unpaired Small Samples and Proportions<br><br>Note: The slides for Section 9.3 can be found here; they were inadvertently omitted from the lecture notes. | Page 1: Hypothesis test for the difference in the averages of two small samples<br>Page 7: Hypothesis test for the difference of two proportions |
| **April 21** | Lecture #22 | 12.5 | Correlation | *To be added later* |
| **April 23** | Lecture #23 | 12.2, 13.2 | Linear and Intrinsically Linear Regression | Page 8: Intrinsically Linear Regression: Percolation<br><br>Page 9: Intrinsically Linear Regression: Planets |
| **April 28** | Lecture #23 | 12.2, 13.2 | Linear and Intrinsically Linear Regression | Page 8: Intrinsically Linear Regression: Percolation<br><br>Page 9: Intrinsically Linear Regression: Planets |
| **April 30** | **Exam #3** | Chapters 8-9 | Review #3 | The videos below give the solutions to each of the review |

| | | | | |
|---|---|---|---|---|
| | | Lectures 15-21A | | exercises. I encourage you to attempt each problem on your own before watching the videos.<br><br>3.1 3.2 3.3 3.4 3.5<br>3.6 3.7 3.8 3.9 3.10<br>3.11 3.12 3.13 3.14<br>3.15 3.16 3.17 |
| **May 5** | Lecture #24 | 14.1, 14.3 | The Chi-Squared Distribution | Page 8: Specified Proportions<br>Page 9: Testing Independence |
| **May 7** | **Review** | Chapters 12-14<br><br>Lectures 22-24 | Review #4 | The videos below give the solutions to each of the review exercises. I encourage you to attempt each problem on your own before watching the videos.<br><br>4.1 4.2 4.3 4.4<br>4.5 4.6 4.7 |
| **May 14, 10:30 am-12:30 pm** | **Final** | | | |

---

# Student Responsibilities

- Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Center for Student Rights and Responsibilities to consider whether the student's conduct violated the Code of Student Conduct. The university's expectations for student conduct apply to all instructional forums, including university and electronic classroom, labs, discussion groups, field trips, etc.
- You should read over this syllabus carefully, as I will hold you responsible for the information herein.
- Students will be expected to read the chapters carefully, including the examples in the book.
- Students will be responsible for obtaining any and all handouts. If you are not in class when handouts are given, it is **your** responsibility to obtain copies.
- **You should begin working now.** Frequent practice is crucial to the successful completion of a mathematics course. Cramming at the last minute will certainly lead to failure.
- **WARNING:** If you are in academic trouble, or are in danger of losing your financial support, or if your parent or guardian is expecting a certain grade at the end of the semester... start working today. I will refuse to listen to any pleas at the end of the semester. You will receive precisely the grade that you *earn*.

---

# Grading Policies

You may find the advice of former Math 3680 students helpful.

The following schedule is tentative and is subject to capricious changes in case of extracurricular events deemed sufficiently important to the upper administration.

| | | |
|---|---|---|
| Final Exam | May 14, 10:30 am-12:30 pm | 24% |

| | |
|---|---|
| A | 90% and above |

| | | |
|---|---|---|
| Exam 1 | c. Week 5 | 20% |
| Exam 2 | c. Week 9 | 20% |
| Exam 3 | c. Week 14 | 20% |
| Homework | | 16% |

| | |
|---|---|
| B | 80% and below 90% |
| C | 70% and below 80% |
| D | 60% and below 70% |
| F | below 60% |

Cooperation is encouraged in doing the homework assignments. However, **cheating will not be tolerated on the exams**. If you are caught cheating, you will be subject to any penalty the instructor deems appropriate, **up to and including an automatic F for the course**. Refer to the following university site for the official policy with regards to academic dishonesty: http://vpaa.unt.edu/academic-integrity.htm.

Attendance is not required for this class. However, you will be responsible for everything that I cover in class, even if you are absent. It is my experience that students who skip class frequently make poorer grades than students who attend class regularly. You should consider this if you don't think you'll be able to wake up in time for class consistently.

The grade of "I" is designed for students who are unable to complete work in a course but who are currently passing the course. The guidelines are clearly spelled out in the *Student Handbook*. Before you ask, you should read these requirements.

---

# Exam Policies

- I expect to give exams on the days shown above. However, these are tentative dates. I will announce the exact date of each exam in class.
- You will be expected to bring to class --- including exams --- either a laptop computer with a spreadsheet program (such as Microsoft Excel or Open Office Calc) or else a calculator that can perform multiple statistical functions. **I strongly encourage you to recharge the battery of your laptop or calculator the night before the exam.** Also, if you're bringing your laptop, you may wish to **also bring a power strip**, as electrical outlets are not plentiful in the classroom.
- After exams are returned in class, you have 48 hours to appeal your grade. I will not listen to any appeals after this 48-hour period.
- I will not drop the lowest exam score; all will count toward the final grade.
- Students missing an exam for unauthorized reasons will receive 0 (zero) points on the exam. Students will be required to provide *official written* verification of any authorized absences.
- The Final Examination will be comprehensive in the sense that problems may come from any of the sections that will be covered during the semester.
- The grade of A signifies *consistent* excellence over the course of the semester. In particular, an A on the final is not equivalent to an A for the course.
- **You may choose not to take the final examination**, under the following rules:
    - If your course average before the final is 93.00 or higher, you will be given an A for the course.
    - If your course average before the final is between 83.00 and 92.99, you will be given a B for the course.
    - If your course average before the final is between 73.00 and 82.99, you will be given a C for the course.
    - If your course average before the final is between 63.00 and 72.99, you will be given a D for the course.
    - If your course average before the final is less than 63.00, you will be given an F for the course.

  The idea of this policy is that, if you are comfortably above the cut-off between grades at the time of the final exam, then you can receive the higher grade without taking the final. However, if you are too close

to the cut-off, then you need to take the final to earn the higher grade. I need to be notified **in writing** (e-mail is acceptable) if you wish to be exempt from the final examination.

- I reserve the right to test and quiz you on problems which are generalizations of material covered in the class and/or in the text. In short, the problems may not look exactly like the ones in the book.
- Everything that I say in class is fair game for exam material. You will be responsible for everything unless I advise you to the contrary.

---

# Homework Policies

- All homework assignments can be logging into www.webassign.net.
  - Each part of each exercise can be attempted up to 10 times. In other words, you could submit answers to part (a) of Exercise #1 up to 10 times, and then you could move on to attempt part (b).
  - Your last submission will count as your final answer.
  - You can save your work without using a submission.
  - Some exercises will use randomization. In other words, it's possible that every student will have slightly different questions with accordingly different answers.
- Due dates
  - Homework will be due every Friday at 11:59 pm.
  - A 5% bonus will be awarded to students who complete their homework more than 48 hours before the due date.
  - If requested no more than a week after the original due date (i.e., by the following Friday at 11:59 pm), it is possible to receive an automatic extension on homework through Enhanced WebAssign. Any work done after the automatic extension can be submitted for half credit as long as it completed within 24 hours of the request.
- When computing grades, I will drop the **two** lowest homework grades before computing the homework average. Therefore, in principle, you could get a 100% homework score and also not turn in two assignments during the semester. I have this policy in case you get sick, a family emergency arises, etc., during the semester. You will still be responsible for the material in such assignments during the examinations.
- With the exception of the automatic extensions noted above, I will **not** give extensions on homework assignments (called *manual* in Enhanced WebAssign), nor will I accept late assignments.

---

# Note to TNT Students

- If you're pursuing secondary teacher certification through Teach North Texas, then you may be aware that you will be required to construct a preliminary teaching portfolio in EDSE 4500 (Project-Based Instruction) and a final portfolio during your final semester of student teaching. Section 2 of this portfolio will ask you to demonstrate your knowledge of your content field. You may find that some of the assignments may naturally become artifacts toward part of this task, and so I encourage you to keep your work after the semester is over to make the eventual construction of your portfolio easier. You may even want to write (and save for later) a brief reflection on the artifact you select, rather than try to remember why the artifact you chose was important once you reach EDSE 4500.
- The specific indicators in the portfolio related to knowledge of mathematical content are as follows:
  - Reflect on one or more artifacts in which you state a mathematical theorem or conjecture and apply both formal and informal mathematical reasoning to the same conjecture.
  - Reflect on one or more artifacts that show your ability to describe a mathematical concept that can be represented in multiple ways and articulate the connections between its representations in clear, expository prose. Where relevant, identify appropriate technology for exploring the concept and explain limits the technology may place on the knowledge acquired.
  - Reflect on one or more artifacts that show your ability to generate a model of a natural phenomenon or describe an already existing model and evaluate how well the model represents the situation, including consideration of the risks, costs, and benefits of the alternatives.
  - Reflect on one or more artifacts that show your ability to identify a topic in your subject area and describe its connection with prerequisite topics, future topics, and other subjects.

    - Reflect on one of more artifacts that show how you bring out the historical and cultural importance of your subject material, its contribution to large ideas, and its significance in today's society. Include a specific lesson plan that incorporates the general history and cultural context of modern science or of mathematics as these fields have evolved.
- Just to be clear: the above are suggestions for TNT students. This is NOT a course requirement for Math 3680.

---

# Final Note

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the Office of Disability Accommodation website at http://www.unt.edu/oda. You may also contact them by phone at 940.565.4323.

WebAssign ONLINE HOMEWORK AND GRADING

Course Name: Math 3680.001
Start Date: 1/20/15
Instructor Name: Dr. Quintanilla
Class Key Code: unt 6709 6156

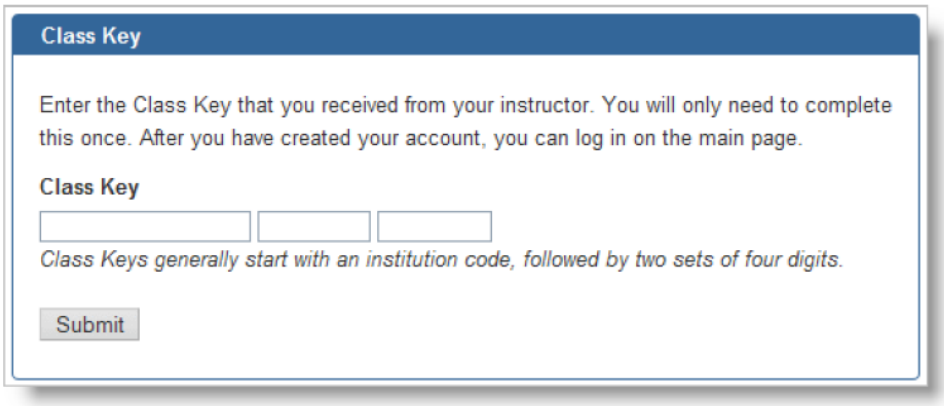
# Enrolling Yourself in a Class Using a Class Key

If your instructor gives you a WebAssign class key, you can enroll yourself in the WebAssign class roster. If you do not already have a WebAssign account, you can create one after verifying the class key.

> **Important**: An access code is not the same as a class key. You need a class key to enroll. You might need to pay student fees later with your access code.

**To self-enroll for a class:**

1. Go to the WebAssign login page (www.webassign.net), and click **I have a Class Key**.

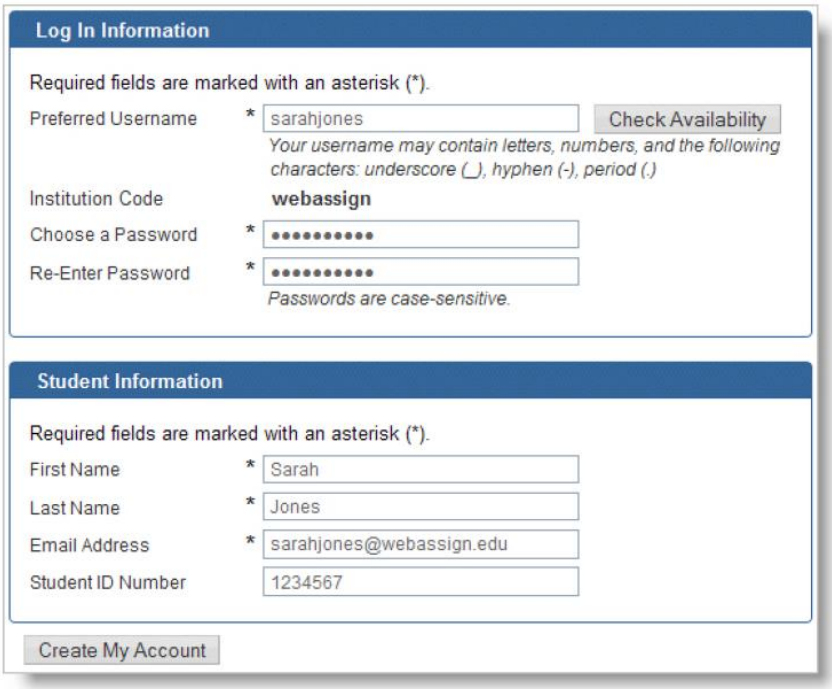



2. Enter the Class Key your instructor gave you, and click **Submit**.
3. On the verification page, check the class information and determine whether or not the correct class and section is displayed.
   - If the correct class and section is listed, click **Yes, this is my class** and go to step 4.

4. If you have an existing WebAssign account, select **I already have a WebAssign account**, type the **Username**, **Institution**, and **Password** for your account, and click **Continue**. You are enrolled in the class and logged in to WebAssign using your existing account.

5. If you do not have an existing WebAssign account, you can create one now.

   a. Select **I need to create a WebAssign account**, and then click **Continue**.




   b. Type the username that you would like to use for your WebAssign account in the **Preferred Username** field, and click **Check Availability** to see if the username that you want is available. Usernames are not case-sensitive, so BobSmith, bobSmith, and bobsmith are all the same username.

   c. After confirming the availability of your new username, type a password in both the **Password** and **Re-Enter Password** fields. Passwords are case-sensitive, so IAmCa3sar is not the same as iamca3sar.

   d. Enter your **First Name**, **Last name**, and **Email Address**, and optionally your **Student ID Number**.

   e. Click **Create My Account**.

WebAssign confirms that your account has been created. You can click **Log in now** to log in to the new user account and go to your home page. Remember your username and password, because you will need them each time you log in.

> **Tip:** If you forget your password, you can click the **Reset Password** link on the login page. If you forget your username, your instructor can look up your username for you.