

Data and Chance CTY Course Syllabus

Day	Time	Objectives	Activities
1	MORNING	<ol style="list-style-type: none"> 1. Create a knowledgeable environment in regards to expectations and rules 2. Get to know students 3. Set up binders 4. Create safe environment through team work 5. Assess prior knowledge 6. Create safe environment through team work 7. Develop an understanding of the data collection process 	<ol style="list-style-type: none"> 1. Go over Course Syllabus/Expectations 2. M&M or Skittles activity to get to know each other. 3. Organize binders and tabs 4. Team Building activity 5. Pre-Test 6. Team Building Activity 7. Data - The Big Picture Discussion (NCTM Model) Discuss and introduce statistical project
	AFTERNOON	<ol style="list-style-type: none"> 8. Determine what a line plot may be showing 9. Determine why stats and data are misleading at times 	<ol style="list-style-type: none"> 8. Mystery Data A 9. Misleading Statistics Packet- Read, reflect, and discuss (3 things learned-2 surprises-1 question)
	LATE AFTERNOON	<ol style="list-style-type: none"> 10. Work with basic functions of calculators 11. Review important vocabulary from the day 	<ol style="list-style-type: none"> 10. Graphing Calculator Art 11. Vocabulary Log
2	MORNING	<ol style="list-style-type: none"> 1. Review vocabulary from yesterday 2. Interpret stem and leaf plots 3. Review concepts of mean, median, mode, and range and percent 4. Make circle graphs to represent data and use known data to make predictions 5. Make predictions from data using proportional reasoning 	<ol style="list-style-type: none"> 1. Finish vocabulary terms from yesterday 2. Basketball player heights – Stem and Leaf Plot 3. Complete Mystery Data Set Cards. Go over how to find mean, median, mode, and range on calculators. 4. Complete M&M Count and Crunch (all but probability section at this point) 5. How might make predictions from this data? Complete proportions section (Judging population from sample...How close did they samples come to the actual?)

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	AFTERNOON	<p>6. Write data based statements to draw conclusions from line plot</p> <p>7. Analyze which measure of central tendency best fits a situations</p>	<p>6. Mystery Data B</p> <p>7. Read, reflect, and discuss Chapter 2 of Huff's How to Lie with Statistics (3-2-1)</p>
	LATE AFTERNOON	<p>8. Describe which measure of central tendency best typifies a data set</p> <p>9. Determine how to identify outliers using inter-quartile range</p> <p>10. Use Graphing Calc to determine 1 variable statistics</p>	<p>8. Complete MMR worksheet with 5 data sets and discuss results.</p> <p>9. Complete water drop experiment and then use as an example to determine outliers</p> <p>10. Use data from M&Ms or water drop experiment to utilize calculator functions.</p> <p>11. Update vocabulary log (mean, median, mode, range, lower quartile, upper quartile, outlier, stem and leaf plot, proportional)</p> <p>REMINDER: Think about question to explore in statistical project.</p>
3	MORNING	<p>1. Determine outlier from bar graph using IQR and analyze graph</p> <p>2. Use Graphing calc to interpret/create graph</p> <p>3. Make and interpret box and whisker plots</p>	<p>1. Use Length of Cats handout to practice determining outlier and MMR. Discuss results. Add determining if there are any outliers to questions.</p> <p>2. Have students input data into Graphing calc (make box and whisker and then copy L1 and make adjusted box and whisker) Discuss: What is the difference? What are these graphs showing us?</p> <p>3. Comparing Fast Food Data – Make two Box Plots to compare calories in each and make argument for which to buy on poster</p>

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	AFTERNOON	<p>4. Continue work on creating advertisement to “lie” statistically</p> <p>5. Collect data</p>	<p>4. Continue work on posters.</p> <p>5. Collect data on exercises outside (heart rate at rest, heart rate after running in place for 30 seconds, time balancing on one foot, time to run or walk 25 feet).</p>
	LATE AFTERNOON	<p>6. Interpret a histogram and determine its similarities and differences to other types of graphs</p> <p>7. Create a histogram to organize outside data collection</p> <p>8. Discuss surveys</p>	<p>6. Interpret “Drop Off” handout.</p> <p>7. Organize data into a histogram and a relative frequency histogram. Use presidents to practice.</p> <p>8. Work on finalizing statistical project question and develop a 5 -7 question survey to gather data about topic.</p>
4	MORNING	<p>1. Use appropriate statistical vocabulary</p> <p>2. Create and interpret histograms and relative freq. histogram</p> <p>3. Interpret different distribution shapes and what they reveal about data</p> <p>4. Calculate variance and standard deviation and describe what these two measures tell us about a data set</p> <p>5. Complete an experiment to utilize standard deviation and box plots to draw conclusions</p>	<p>1. Update VOCAB LOG</p> <p>2. Complete President’s death data</p> <p>3. Examine several graphs (histograms) and describe how they are the same different. Note distribution shapes and what they mean about the data.</p> <p>4. Complete VARIANCE and STANDARD DEVIATION handout together (for 1st problem). Complete second one on own.</p> <p>5. Complete Are You Ambidextrous Activity to explore application of box plots and standard deviation</p>
	AFTERNOON	<p>5. See above</p> <p>6. Define the purpose and uses of scatter plots and related terms</p>	<p>5. Finish Ambidextrous experiment</p> <p>6. NOTES/Discussion – Scatter plots</p>

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	LATE AFTERNOON	7. Utilize new skills in linear regression to solve problem 8. Collect data	7. Continue Scatter plot discussion 8. NEED FOR SPEED (begin data collection)
5	MORNING	1. Review data vocabulary 2. Utilize a scatter plot to determine relationships 3. Examine data to create better flyer and draw conclusions 4. Use a scatter plot to determine relationship between two flight variables	1. VOCAB LOG Update 2. Analyze Need for Speed with scatter plot- Is there a relationship between any pair of variables? 3. Complete Paper Airplane activity as written 4. Compile class data from planes and have pairs of students create a scatter plot comparing two variables of flight and completing regression... Is it linear? Not linear? Proportional? Have each group share with the class.
	AFTERNOON	5. Create and type survey for statistical project	5. Go to computer lab to type questionnaire and letter to instructors to ask to administer or take.
	LATE AFTERNOON	6. Assess knowledge so far 7. Catch-up 8. Review Concepts from the week	6. CHECK-UP QUIZ 7. Continue analyzing plane data their plans work. Complete work with M&Ms – Proportionality/Posters 8. Write End of Week Feedback journal

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6	MORNING	1. Review 2. Use concepts of proportionality to draw pictures 3. Review previous concepts from last week 4. Connect the word “chance” to formal probability concepts	1. Warm-Up – Accepted Interval/Circle graph/CT 2. Proportionality/Fuzzy Linear NOTES 3. Discuss/finish plane scatter plots/Discuss what other information could we analyze with data displays (comparing dist with soft/hard with box plots or histograms, etc.) TURN in Graphs and data sheets. 4. Discuss in small groups: a.) <i>If there is the possibility that I may make more money if I start my own business and quit my current job, should I do it?</i> b.) <i>There is a possibility that my house may flood, should I buy flood insurance?</i> c.) <i>My math teacher may collect my homework, should I do it?</i> Discuss data/probability connection and connect to 0 to 1 scale.
	AFTERNOON	5. Analyze how choice and chance play a role in decision making	5. Students will play and analyze SKUNK.
	LATE AFTERNOON	6. Test run surveys 7. Utilize Microsoft Excel to Graph data	6. Students will examine surveys thus far and offer constructive criticism 7.LAB (analyze plane data and background survey data)

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7	MORNING	1. Review 2. Define and demonstrate basic concepts of experimental and theoretical probability 3. Use tree diagrams and lists 4. Develop method for computing compound probability	1. VOCAB LOG 2. Probability Notes → Probability ACT 1 – Law of Large Numbers exercise 3. Complete Tree Diagram and FCP guided notes and then apply to Test Guessing 4. Reflect on Test Guessing. What is $P(C)$... What do you notice? Go through guided notes on COMPOUND PROBABILITY.
	AFTERNOON	5. Apply concepts of compound probability to games	5. Play Dog Race Game
	LATE AFTERNOON	6. See #5 7. Review Concepts	6. Analyze Dog Race Game Results 7. Check-up QUIZ #2 8. Test Predictions from NEED for SPEED
8	MORNING	1. Interpret comparative box and whisker plots 2. Determine fairness of a model based on weighted probabilities	1. Take Out (outliers) 2. Weighty Decisions. Flip 2 Chips, and then analyze Black Jack... what is the $P(\text{Winning})$
	AFTERNOON	3. Determine the probability of two people having the same birthday. Determine the number of people needed to be in a room in order for this to happen	3. PICTURE (1:00 – 1:15) Complete Birthday activity guide - Read excerpt from Beyond Numeracy. Read, Reflect, discuss (3-2-1)
	LATE AFTERNOON	5. Explore concepts of probability using carnival games	5. Play and improve games in A Day at the Carnival

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9	MORNING	1. Review concepts of scatter plots and lines of best fit 2. Develop algorithm for finding permutations 3. Develop an algorithm for finding all possible combinations	1. Solve Mystery - Tracks of a Killer 2. Permutation Guided Notes/exploration 3. Combination exploration
	AFTERNOON	4. Students will create their own game of chance	4. Students will develop a game that involves choice and chance in a group of 2-3. They will write clear rules and answer follow-up questions. They must also then explain the mathematical logic behind their game. What is more likely? What is possible? What strategies might a player employ?
	LATE AFTERNOON	5. Apply concepts of combinations and permutations 6. Work on Games	5. Practice Problems using FCP /Worksheet from state and DACH Binder 6. Work on Games
10	MORNING	1. Apply concepts of diagrams, exp and theoretical probability to Monty Hall Problem 2. Apply concepts of probability to help mathematical advice column	1. Monty Hall – Stick or Switch 2. Dear Dr. Math
	AFTERNOON	3. Review Concepts	3. MATH BOWL to review concepts learned so far /Work on projects
	LATE AFTERNOON	4. Reflect on the week 5. Create game of choice/chance	4. Complete Weekly Reflection 5. Work on game and survey sorting

Day	Time	Objectives	Activities
11	MORNING	1. Review concepts of theoretical vs. experimental probability 2. Use probability concepts to explore expected value 3. review concepts of correlation coefficients, interpolations and extrapolation	1. Complete Fish pond warm-up 2. Complete Playing with a Full Deck 3. Olympic Gold Times (scatter plots and linear regression)
	AFTERNOON	4. Use data to discover who wrote writing sample 5. Sort Surveys	4. Complete Stylometry activity 5. Begin tallying survey results for later analysis in LAB
	LATE AFTERNOON	Work on collecting and compiling data for statistical projects (work in LAB to use Excel)	PROJECTS
12	MORNING	1. Review concepts of standard deviations and comparing box plots 2. Show understanding of concepts 3. Finish unfinished projects/work	1. Complete Comparing Box Plots worksheet 2. QUIZ 3. PROJECTS (Games)
	AFTERNOON	4. Use concepts of complementary probability to determine the number of people needed to ensure a 50/50 chance of sharing a birthday	4. Complete birthday problem
	LATE AFTERNOON	Work on collecting and compiling data for statistical projects (work in LAB to use Excel)	PROJECTS (Gym Lab)

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13	MORNING	1. Review relative frequency and double bar graphs 2. Analyze experimentally and theoretically if a game is fair 3. Review concepts of Data collection and linear regression	1. Complete Fair Spinners activity 2. Play Two Dice Games 3. Barbie Bungee
	AFTERNOON	4. Test Barbie Bungee findings	4. Test Barbie Bungee calculations PROJECTS (Games must be finished today!)
	LATE AFTERNOON	5. Work on collecting and compiling data for statistical projects (work in LAB to use Excel)	5. PROJECTS- Print out draft
14	MORNING	1. Use the area model of probability to solve problems 2. Review concepts of creating sample spaces and computing probabilities 3. Use proportional concepts to predict populations 4. Projects	SPE Evals 1. Darts, anyone 2. Play Yahtzee and analyze results 3. Fish recapturing 4. Post-Test
	AFTERNOON	5. Projects	5. PROJECTS
	LATE AFTERNOON	6. Finish written part and graphs for projects	6. PROJECTS/Play and evaluate games of chance
15	MORNING	1. Present projects/share findings 2. Evaluate games of choice/chance 3. Reflect on CTY experience	1. Present Survey Projects 2. PLAY GAMES OF CHANCE/CHOICE/Evaluate 3. KWL (L section - Write final reflection)