Catalyst 120 – Quantitative Reasoning
Sample Courses

CTL 120: How Numbers Persuade the Public (Martin)
Every day we encounter numbers in many different forms and from a wide variety of sources. Endless statistics, rankings, polls, charts and graphs, and other forms of quantitative evidence are used to attempt to convince you. How can we know which numbers to trust? This course will provide you with the skills you need to determine if the numbers you hear are reliable as evidence. Throughout the course, we will investigate how numbers are produced, who counted, what was counted, how did they count it, and what they are trying to claim by reporting those numbers to the public. *No prerequisites*.

CTL 120: Dimensions of Life: Measurements in Biology (Wallace)
Daily we are assaulted with numbers offered as graphs, tables, percentages, etc., and all of it appears to be aimed at persuading us a point of view or to make a purchase. Regardless of one's interests, when it comes to evaluating numerical evidence we need to be able to answer the question: how do we know what we say we know? While focusing on biological phenomena, this course will help students develop their skills in collecting and organizing quantitative data, making assessments about that data, and communicating their findings to a variety of audiences. *No prerequisites*.

CTL 120: How Do We Learn and Remember in Our Every Day Lives? (Kovack-Lesh)
This course seeks to explore the various ways individuals learn and remember things and the impact of those areas of study on our daily lives. For example, are there more effective study techniques? How important is self-discipline in learning? We will explore various questions related to these topics using quantitative evidence and emphasizing critical thinking. We will also collect some data ourselves and draw conclusions using quantitative reasoning. *No prerequisites*.

CTL 120: The Global Economy by the Numbers (Mahoney)
Economic globalization is a controversial issue with real-world consequences: cheap consumer goods and booming foreign trade opportunities, but also the loss of good-paying jobs (including office jobs as well as factory jobs) in rich countries like the United States. What can numbers tell us about the impact of globalization on the U.S. economy and on other economies throughout the world? Is one country's loss another country's gain, or does everybody come out ahead? Is the United States in economic decline? Is the gap between rich countries and poor countries widening or narrowing? Is immigration good or bad economically? And what effect has the environment had on the global economy? Is overpopulation leading to poverty? Are we running out of oil and other natural resources? *No prerequisites*.

CTL 120: Truth or Lies: Unwrapping the "Facts" We Encounter (Schatzinger)
How do we distinguish between reliable data and distortions, half-truths, and outright lies? What steps can we take to better evaluate empirical claims, news, and reports? This course will provide you with a number of tools on how to detect mishandled statistics, graphs and faulty arguments. It also wrestles with the limitations of determining whether something is true or false and we explore how randomness and probability affect our lives. Lastly, this course will give students practical tools on how to organize data and create visual representations of data. *No prerequisites*.

CTL 120: Making a Case in Our Digital World (Dalziel)
This course will focus on how to evaluate the data and claims we see online and in social media, as well as how to construct your own presentations of information. Students will learn how to distinguish between valid and invalid claims and arguments, and how to present information to an audience. Students will also learn skills in adobe creative cloud software to present information in digital form. *No prerequisites*.

CTL 120: Precise Propositions and Dicey Decisions (Lamb)
This course is about using basic quantitative methods to make sense of potentially confusing, but important and unavoidable, real-world situations. The student will learn how to formulate questions in precise terms and how to give meaningful answers. You will learn how to construct and defend rigorous arguments and how to analyze the arguments of others. You will learn how to quantify real-world decisions and their consequences. Above all, the student will gain an appreciation for the power of a few elementary mathematical tools--including proportions, spreadsheets, and basic probability--and for the profound impacts that they have on our lives. We will apply these tools to medical test results, election forecasts, saving for retirement, jury trials, and many other situations. *No prerequisites*.

CTL 120: Cosmic Detectives: What We Know About the Universe and How We Know It (Simon)
We know a lot about how the universe works. Have you ever wondered how we learn about the inner workings of a proton or what the universe was like seconds after the Big Bang? From the smallest scales to the largest, physicists use a variety of ingenious techniques to learn about the universe in which we live. In this class, you will study a variety of indirect detection techniques involved in discoveries ranging from water on Mars to planets beyond our solar system; from gravitational waves to the expansion of the universe. Through a series of simple experiments, you will investigate several recent advancements in cosmology, astrophysics and particle physics. *No prerequisites*.

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CTL 120: The World is Going to Hell (Hatcher)
Or is it? Are humans becoming more or less violent over time? How would we know? Human violence is, according to the news, a simple fact of life, yet the question of whether we are becoming more or less violent over time is one that is not simple to answer. This course will explore various types of violent behavior over the last several hundred years and, in doing so, will ask important questions concerning the selection, measurement, and interpretation of relevant data. Critical thinking and the objective analysis of data will be emphasized, but we will also talk about the psychological factors that are important when confronting one's own opinions and theories with data that may or may not support them. *No prerequisites*.

CTL 120: Mathematical Discourse in Everyday Life (Scott)
This course centers on the construction and presentation of valid arguments, both written and oral, particularly those relying on quantitative data. Students will improve at constructing such arguments both through direct practice and by learning to recognize many common flaws in the arguments of others. Hunting grounds for dubious data and argumentation will be found in the media; the role of chance and how to make wise decisions in life will supply the mathematical topics. For example, how do we measure risk, and how might this affect public policy? How can we evaluate competing claims about topics in the news? When does mathematics actually answer questions, and when does it just illuminate the gray areas? Specific skills developed will include proportional reasoning and the use of spreadsheets, but no special prior knowledge is expected. *No prerequisites*.

CTL 120: The Air in Beijing, The Water in Flint, and The Temperature in Ripon (Byron)
No one wants to breathe contaminated air nor drink polluted water but how do we evaluate what our levels of unsafe chemical exposure are or could be? This course develops quantitative assessment and communication skills associated with measurement and discussion of air and water pollution and the strategies employed to minimize personal exposure. The discussion will expand into a quantitative look at the chemistry of climate change and the use of fossil fuels and the strategies for minimizing imbalances in atmospheric composition. No previous chemistry background is required. *No prerequisites*.

CTL 120: First Year Facts or Fiction? (Khan)
As an incoming freshman student you may have a few questions. Will I gain the 'Freshman 15'? Do I have the study skills to succeed in college? How will I balance my social life and study demands? Which major is the best for my future? Additional questions will be addressed according to class interests. We will explore these questions using quantitative evidence, some of which will collect ourselves, and draw conclusions using quantitative reasoning. *No prerequisites*.