

CHAPTER 0

INTRODUCTION

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Outline

1. What is Statistics
2. Administrative details
3. About the next chapter

1. What is Statistics

2. Administrative details

3. About the next chapter

- ◇ In one line perhaps we can say *Statistics is the language which we use to collect, analyze and interpret a data.*
- ◇ What is data? Data is a set of information presented in a systematic way.
- ◇ In this world, the use of data is almost everywhere, and often it happens so fast that we don't even realize it.



Figure 1: A title of an article of the Forbes magazine, November 4, 2020

- ◇ Let's see some real life examples.

- ◇ **Location data:** Think about you are driving a car with your friend. Then if you are using GPS, Google collects data about where are you, where you going and and how much it time it took you to go to your destination. Then Google uses this data to give you prediction about the traffic. Just open Google map, and you will probably see it.



Figure 2: GPS trackers

WHAT IS STATISTICS?

- ◇ **Browsing data:** Google and Facebook collect many information when you are on your web browser searching different things. These are all data. Google continuously collects this data and then show you contents that you might find interesting and useful. Sometimes they also sell this data to other companies (e.g., as a part of marketing). Interestingly Google also shares different search patterns across the world, look at google trend website ¹.



Figure 3: Browsing data

¹<https://trends.google.com/trends/?geo=BD>

WHAT IS STATISTICS?

- ◇ **Household Surveys:** Sometimes Government or other research organizations collect important information from families or households using surveys. This is known as *household surveys*. This has information about family income, expenditure, education levels and many more. With this data we can get many useful information, for example average income or expenditures of different families in Bangladesh.

[illegible]

Note: *Write complete years. For example if age is 18 years and 9 months, write only 18 years.
Interviewer: Please find the code list for this Module B1 in the next page.

Figure 4: A page from the questionnaire of the Bangladesh Integrated Household Survey (BIHS) 2015, IFPRI

- ◇ **Weather Forecasts:** We all know about whether forecasts. Now this is also an application of Statistics. Whether it is going to be raining tomorrow or not, we can try to predict this using historical weather data in the specific location.
- ◇ **Financial data:** If you are an expert with financial data, perhaps you might get very rich! Actually it's not that simple. but it's true that financial data is possibly the earning source of many people.
- ◇ **Data analyst in companies:** Many companies are now looking for good data analysts. You might have heard about “Machine Learning” or “Data Science”². Usually any company has lots of data about its different activities, and if we can analyze these data properly, this might be very beneficial for the company, because companies can use them for different tasks, for example maximizing the sales, minimizing the costs, planning, and perhaps many more.

²If not, just google them.



Figure 5: About the Statistics Career, taken from <https://thisisstatistics.org/>

- ◇ So now you got some idea about different type of data sets, and the work of Statistics is to analyze and extract useful information from data sets.
- ◇ Statistics uses the concept “*randomness*”, more concretely when we have a data in Statistics we say we have a “*random sample*”. Question is what does *randomness* mean (you should always ask questions)?
- ◇ To understand and explain this properly scholars from past developed a new language and it is called *Probability Theory*³
- ◇ With Probability we can explain uncertainty.
- ◇ At the first part of this part of this course we will learn about Probability Theory, towards the end of the course we will see some Statistics, and then you will see more Statistics in the course ECO204.
- ◇ But don't worry this course is going to be fun and challenging, so get prepared

³Probability Theory is a branch of Mathematics. Mathematics is also a language, in fact it is often called the *language of Science!*

1. What is Statistics

2. **Administrative details**

3. About the next chapter

- ◇ Welcome to the course! This is ECO104 - Section 4, so if you are looking for a different class, please leave, otherwise enjoy!
- ◇ There will be a [google classroom](#), you will receive the invitation [via email](#). If you don't know how to use google classroom, please ask your friends who can, or let me know.
- ◇ You will get the detailed course outline in the Google classroom.
- ◇ Also **please check your emails regularly, this is very very important!**
- ◇ The classes are on Mondays and Wednesdays (10.10 - 11.40), Room - AB3-902.
- ◇ The details about the quizzes and problem sets will be in the outline.

- ◇ All important dates are in the academic calendar <https://www.ewubd.edu/academic-calendar-details/fall-2022-undergraduate-programs>, so please check it carefully.
- ◇ All exam dates are in the exam calendar <https://www.ewubd.edu/academic-calendar-details/fall-2022-exam-schedule>
- ◇ If you have any questions or concerns please do not hesitate to ask me, the fastest way to get your answer is via email, so please write your question clearly in a formal way and also write your name, course, section so that I can recognize you. The email address is tanvir.hossain@ewubd.edu
- ◇ So now let's start!

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- ◇ In this course we will need some math concepts to understand Probability theory and Statistics.
- ◇ Some of these concepts you have already seen in your previous math courses (e.g., MAT100) or college level math, so I am not going to teach these things again in detail, but I will try to give you a *fast recap*.
- ◇ In particular we will review
 - ✓ *Sets* - Definition of a set, subset, empty set, universal set, complement set, union of sets, intersection of sets, difference between two sets, Cartesian product of sets and power set.
 - ✓ *Functions* - Definition of a function, domain, co-domain, range and limit of a function.
 - ✓ *Counting Methods* - Multiplication rule, permutation and combination
 - ✓ *Differential and Integral Calculus* - you need to understand what is the meaning of a slope of a function, the concept of derivative and the concept of integration.
- ◇ In the next chapter we will review Sets, Functions and Counting Methods. Later in the course we will do a review of some concepts in differential and integral calculus.

- ◇ Our goal is to understand the concepts, not just doing crazy math problems.
- ◇ These are simple math concepts, so please do not be scared just because this is math. When it comes to studying Mathematics often people fall into some mental traps. So please try to avoid following traps -
 - ✓ “Everyone else has been doing math for so long and there is no way I’ll ever be as good as them.” (NO! and please stop thinking this!)
 - ✓ “A small minority of people are math geniuses and everyone else has no chance at being good at math” (Everyone has more or less same brain, so use it, you can be genius too!)
 - ✓ Being good at math means being able to instantly solve any math problem thrown at you. (Not necessarily, Math needs both understanding the concepts and practice!)
 - ✓ “Being good at Math means one can solve crazy calculations pretty fast (Not necessarily, crazy calculations is not the art of the math.)”

◇ Here are some advice -

- ✓ Have a Growth Mindset!
- ✓ Question everything!
- ✓ Attend lectures consistently.
- ✓ Write and think, and also think and write!
- ✓ If you find any mistakes in my explanation, that is good news :), means you are thinking critically, please let me know!
- ✓ Study strategically and with motivation, not mechanically!

“If people do not believe that Mathematics is simple, it is only because they do not realize how complicated life is.” - John von Neumann (1903 - 1957)

According to Franz L, this is remark made from the podium by von Neumann as keynote speaker at the first national meeting of the Association for Computing Machinery in 1947.

Who was Jon von Neumann? - John von Neumann was a Hungarian-American mathematician, physicist, computer scientist, engineer and polymath. He was regarded as having perhaps the widest coverage of any mathematician of his time and was said to have been "the last representative of the great mathematicians who were equally at home in both pure and applied mathematics" (taken from wiki)





Fear of success can be a barrier to achievement. GETTY

Figure 6: fear can be a barrier for success, so stop being scared and work hard,
<https://www.forbes.com/sites/carolinecastrillon/2021/08/22/top-10-reasons-you-have-a-fear-of-success/?sh=54dde6da1c15>