[Captioner standing by]
>> PROFESSOR: We like to start sharp. CS 210. Can you hear me in the back? How many of you know - - basics. We will keep you from getting bored and I think you will like it. Now, the way that we have set up this class because there may be a variety of backgrounds here. You are going to receive a question. Within the next couple of minutes you should receive an email that you are registered for the class. And somewhere in the middle of the lecture we will ask you to go and complete that question. What is the purpose of that question? The purpose is to get a glimpse of where you are with respect to the material in this class. We have our own algorithm and we will take those questions. We select triples, him, him, her. These triples will be weighted. These students will become a group for the class. During the semester you will have assignments that are by group. You will have assignments that are individual. Later on in the semester you will have two, three projects and these projects will be done by groups. Is that clear? So this is a sense of that. For those of you who are unfamiliar with Python we will tell you via Canvas what to do to not get bored and still get credit. Is that clear? So this first lecture will be quite general. Questions so far? Okay. The class is 600 points. We do not curve. We use a standard scale. 90 percent above is N/A. 80 to 90, you get a B+. 70 through 80 you get a C/C++ below that I don't want to talk about. Is that clear? During the semester you are going to have a chance to accumulate bonus points. Bonus points are like in your grade account. They are not part of your grade. But if it happens at the end of the semester you are on the border between a C and a B, between a B and a B+. Between a
B+ and a A. And you have accumulated enough bonus points we look at the savings account of
this person and if you have accumulated then we bump your grade. Do you have to accumulate
bonus points? No. But I think it is kind of silly not to do so. It is up to you. Bonus points cannot be transferred. Because at some point people are doing very well and they say can I have some way of transferring my points to my friend? No. This is an individual account. There is no bonus points by groups. Bonus points individually. Is that clear? Questions? What is the first point of contact for this class? Canvas. You are registered for the class, you should have access to Canvas. Have you guys tried Canvas already? Is everything okay? Canvas will provide you access to all materials for this class. Lectures will be there one week in advance. The assignments will be with that first point of contact, Canvas. Okay? Second point. You may want to ask questions. I will not be able to answer 210 emails. So do not waste your time. We have six systems for this class. Four of them have been assigned to different sections. When you register for this class you said section number, this is section 9, this is section 10, this is section 11 where this is section 12. Each of these groups will have a system dedicated to you guys. You email your questions to that system. Don't send it to me. It will get lost. Is that

clear? If you don't receive an answer within 24 hours then you will have access to another email. That email is the class coordinator. - - A very advanced PhD student. And if your VA for your section does not answer within 24 hours you sent it to him. My assistant is not answering, what's happening here? He will take care of that. If he does not answer within 24 hours then and only then you can send it to me. We want to make sure that your answers are taken care of. Questions about that? Yes? Question? Okay. Textbook for the class. We will be using something unique in this class. We will be using what is called a ZY book. This is a digital book. There are instructions for you on how to get the book. Unfortunately, it is not free. How this works, this is an interactive book. In this book there are a series of questions. We spend the whole summer with other students on this. There are questions in the book. The questions are divided into two types. There are questions we shall call participation questions. And there are questions that I will call - - questions. The participation questions that are there when you answer the question, you get immediate feedback. If it is right or wrong. Then you can try again. You can try as many times as you wish. Is that clear? The purpose of the participation questions is for you to read the material. I don't want to do participation questions. I know Python. Fine, don't do it. Participation questions will be part of your bonus account. Because you don't have to do it. And they are relatively simple and they are necessary for you to be able to answer the questions in the homework. The homework questions are called challenging activities. And we will tell you, homework one, go to chapter 1 or chapter 2. The answer will be there. Challenging activities questions and those are required. Three-way book keeps track of the answers you provided automatically. Is that clear? Those are required. To keep you aware, we will have quizzes. Almost every week. Almost every week. The quizzes will be in class. They will be individual quizzes. They will be short. Seven, eight, nine minutes. The first quiz will be one week from today. To prepare for that quiz you have a homework. That first homework is due this Monday. Before
class. Questions so far? Okay. Yes? Attendance is not mandatory. But I don't know how you're going to survive if you don't come. Not because of me. Not because of the lecture. But it's that time when you have to answer your quizzes. And we don't give makeups. So if you get sick, tell me. Don't get sick when we have quizzes. Don't get sick when we have midterms. You're going to have two midterms. And we are going to have one final exam. Okay. This class, and order for you to survive and to learn, you have to do this every week. Really? Other people have tried differently and failed. We don't want you to fail. My goal is, this is a joint enterprise between you and us. You failed, I failed.
So I'm very much interested in helping you. The TA is also to help you succeed. Questions? Please go to the materials in module zero, a section from canvas and make sure
that you read that. There are certain assignments about mistreatment happening in our society today. For different reasons. Please read that. We take it very serious. We want everybody here to respect everybody. We don't want people making funny jokes about

anybody. Regardless, how many different orientations. We are very serious about this. University is one of those few places in society where we can still be ourselves. Help us maintain that. And if it happens to be that you have a complaint, come to me. I will make sure the complaint goes up to the director and be sure the complaint goes up to the chairman of the department and be sure that complaint goes up to the Dean. Let's respect each other and have fun. Questions? Okay. That is me. It used to be Me. Materials, Canvas website. How the canvas site looks, it looks like a bat. For you to know where we are, this is the speed of the class. The important thing to notice is this is divided into boxes. The first box, Python basics. The second box is SQL. And there are two other boxes. That we will push in assignments back. How many of you know SQL? Good. How many
of you know what regular expressions are? Good. How many of you know what data ranking
is? What is data ranking? Loud, loud. Looking at a data set, how you clean it up. Clean it up. And prepare for processing. That is going to be a chunk of this class. There are four pieces of the class. Peace number one, Python basics. Peace number two SQL. Peace number three, regular expressions. Peace number four, data ranking. The order of this may
switch depending on how we see you making progress in the material but the first part will be Python basics. Lectures, weekly visitations. Make sure that you notice the time for your visitation. If you have section 9 this is the time. Following on campus this is the room, etc. All of these visitations happened today. That is what we discussed. This is the ZY book. You can complete that link and get it. How many of you have tried to get the ZY book? How many of you? How did it go? Okay. Okay. Without this you cannot complete the exercises for the class. Because you need for us. - - This is about traditional grading. This is the changing of it. We may bump the final exam for 20 percent and lower this a little bit but this is about the right thing. If you miss any of this it is very hard to pass the class. If you miss this or this, or this or this it will be very difficult. The class is divided in groups. The first half of the semester is taking care of the basics you need and in the second half you would start working on your projects by groups. If some of you need to let us know about any of these important holidays for you, let us know this week. My main difficulty is that I believe it is Saint Monday. Do you know what that is? You don't know that Saint? Monday. Unfortunately the semester I cannot observe that. Because we have lectures on Monday. Monday is a sacred day for me but unfortunately the semester I have to be here Monday. So. The first reading assignment. First homework assignment due by this Monday. Quiz one is planned for the next day. Bonus points and main communication, I already mentioned. I want to spend 30 seconds about this. We know you copy. There is no mystery here. We know that you work in
groups. There is no mystery here. I am not going to be a policeman here. TA's are not going to be policeman here. That is your own personal decision. But don't be dumb. There are people that go and we don't even look at those. Now, you want to rely on your friend

to answer questions for you. That is delicate. Because ZY book registers who you are and we will know. In any case, if I - - you can work with as many people as you want but you really want to learn the material at some point. You have to be able to write the solutions yourself. If you don't this will accumulate and it will become painful for you. This is a statement I really want you to make sure you are aware of. You experience any of this, there is no. They come back, according to the news, but it is not required. Fill out the questionnaire in this link. Acquire the ZY book link and go to your session. I don't want to do the visitation session. You're going to have to go. Because you will be behind. So this is the first important aspect that I want to make sure you all understand in this picture. Yeah? Today, yes.
>> STUDENT: [Away from mic]
>> PROFESSOR: Canvas is not, sorry. Thank you for pointing that out. The first presentation is today. Thank you, thank you. The first presentation is today. Any comments? About this? You understand this picture? To work in this class you need to understand this picture. Let's try to go to the different pieces of this picture. This is you. No offense. That's you. You are in front of the terminal. The terminal contains some stuff. So what is this? This is the execution of a collection of statements and these are the answers. Coming from here. Questions? Please, be frank, be honest. Tell me. What are these lines? First one says a equals 3.14. This line says Prince parentheses A. This says B equals three and this one says print D. My question, blah law blah and something at the end that says print Z. My question to you is what is this? The relationship to this what? Anybody? Okay, let me help you with the next question. How does this happen? You are sitting in front of the terminal. How does this happen? Yeah? So what are those four lines? Cool. What the heck is that? Instructions. Which language for this class? By phone. What is the Python program? A sequence of instructions. That program could be a sequence of instructions. I want to make sure everyone is involved here. Okay. But then, how does this piece happen? This is a sequence of instructions. Something is being printed here. How does that happen?
>> STUDENT: I believe it goes into a compile or something that turns into machine code.
>> PROFESSOR: Good. He believes that he goes to something like a compiler that transforms
the into machine code. Who can tell me instead of a compiler, what other word can be used
here? Can you help us? Interpreter. So this collection of instructions has to be translated into something that the computer understands. That translation could be reviewed by something called a compiler or by something called an interpreter. What is the difference? Using a compiler and an interpreter? Yeah. Loud, loud, please. Loud.
>> STUDENT: [Away from mic]
>> PROFESSOR: For the compiler he says, you have to take the whole program as a unit. And
pass it to a big program called a compiler. We translate the entire program at once. That is why it is called a batch processing mode. Is that clear? The whole program at once has

to be passed to this compiler. Okay. An interpreter is quite different. An interpreter, there's no need to take the whole program at once. In the translating distance, one instruction at a time. One instruction gets translated. The next instruction gets translated. Then the next instruction. Is that clear? So far so Good? In Python you will need to install in your machine a Python interpreter. It is a big program. That you can install in your machine and we have the ability to take one instruction like that and translate to machine code. Okay but that is only one way. What do I mean? This instruction gets translated by the Python interpreter into some machine code, the machine code has to go into the CPU of your computer. It gets elevated and now has to be written back. When it is written back that's the output you have here. It goes to the CPU and comes back. Really? You do this? Go here, and go here. Not quite. This is very important. For this to happen, the most recent place in your computer, your random access
memory of the computer. There should be a place where this information about the values or
variables in our program are installed. So think of that as a collection of boxes. That is called the random access memory of your machine. In these boxes there is a box that the
interpreter knows corresponds to this variable name here, the letter a. Somehow the interpreter now knows there is allocation that response to a. Here it says a equals 3.14. That 3.14 is stored in that box and now when the CPU elevates has to get access to that and
print the value here. So what are the fundamental steps for the execution of any instruction by an interpreter? Step one, the instruction gets translated. Into machine code. Yeah? Step two, the computer, you don't see that. Elevates the instruction of the CPU looks at. Step threeyou write the answers back to your screen. To be able to do that the machine has to access those values into the random-access memory of the machine. All
of this is happening behind the scenes. I wanted to mention this because through the years we have noticed that people will go through different stages. They take classes in computer science. Somehow they don't seem to have clarity about this. This is the purpose of this picture. So what is a Python program? A serious of instructions in Python, Python is a language. What is a Python script? The Python program we know what that is. What is a Python script?
>> STUDENT: The actual file containing the instructions.
>> PROFESSOR: That is a very good description. Repeat that loudly.
>> STUDENT: The file containing instructions.
>> PROFESSOR: This has to be stored somewhere. In your pocket? No. They are storing files. So whatever you're doing has to go in the file. Who creates that file? Hello? Me? No. You. That's a joke. The program, the user, really, wait a minute. Wait a minute. We were saying that the Python interpreter executes this line by line. There is no file. There is no file. That contains all of the instructions because you are typing.

These instructions as you wish. So there is no file. Well, that's a lie. There is a file. In that case that file is maintained by the computer itself. By the Python interpreter itself. However, you have 300, 500, 10,000 instructions. Over a program that you have developed with your friends. You are not going to be typing these 10,000 lines right there on your screen. At that point you should say wait a minute, this is too much. I know what I'm doing for my whole code. This is not line by line. I'm going to take all of that stuff and put it into a file. And you give to that file name. The computer needs to know what that file contains. If that file contains apples it will say my name.apples. If that file contains bananas it will say my name.bananas. If that file is a job a piece of code it has to say my name. Job extension. The Java extension is a suffix append to the file name that tells interpreter this file is a Python file. This is a Java file.
Then when you take a collection of instructions as what he said and store it in the file that is called a script. A Python script. Raise your hand if you got this so we can start moving faster here. Questions? Okay. Difference between a Python program, Python script is the mechanism to give this a story. Now you have the Python installation. You can click on that link and it's good to be aware of these versions. They will be available to time. And here we tell you these windows, you are using Linux, do this. You want to use -- machines, go to that link. Now, here something says Eunice Leno's. Can someone tell me what that is? I have one person, the same two guys in the back. I don't know. What are you playing? Basketball? Carts or something? Yeah? Operating system. Tell me, some human language. What the heck is an operating system?
>> STUDENT: [Away from mic]
>> PROFESSOR: The interface you use to interact with a computer. I know what you're trying
to explain but the operating system is not really the interface. The interface is just a mechanism to interact with you as a human. An operating system is something a little more
than that. Back there? Loud, please. I like what you said. Repeat it again? This operating system is a program. That manages the resources of the computer. What are the resources of a computer? Storage, files, random access memory. And everything that happens in a computer has to be managed by something. That something is a program. Every
computer has a program inside. That is called the operating system of the computer. A computer without an operating system is just a piece of silicone. It will do nothing for you. Nothing, nothing, nothing. What gives life to a computer is the operating system.
So there are different types of operating systems for different types of machines, different types of vendors and Eunice Leno's has been used here for some time. When was UNIX invented? German? England? France? Norway? China? India? What? Here, 25 miles from here in Bell Labs. The same place as the telephone. There are many things that happen in computer sciences here in the University. Not many people are aware. Linux there's a couple of versions. Because UNIX before, I used to work in Bell Labs with those people many years ago. Okay. So here are the instructions for you. And here is some more

information you may want to check. What is a Python program? A collection of instructions. Raise your hands if there is anything on that slide that you don't understand. This is a class to learn. Don't be afraid of not understanding something. If there is no line that you don't understand raise your hand. Yeah.
>> STUDENT: I'm confused between the difference between the second one in the first one. Does that F really make all the difference?
>> PROFESSOR: She is asking the difference between the second one in the first one? Okay. Anybody? He is asking what is the difference between this and this? Let me help you. This is X equal to 10. What is X? It is a name of a variable. When you say X equals number two, what is happening in my machine according to what happened before? There will
be a place in memory that keeps track of that value to 10 all not box. The name of that box is X. So now. Print, welcome. What is this? This has two special symbols here. One, two, three, four, five, six characters where it says welcome. What is the difference between this? And a normal value? Acts as a value. What is between these? Yeah? It's a string of documents, I can have a string of apples, I can have a string of numbers. This is a string of characters. Okay. It is a string of characters. It's important. There are many types of strings. This is a string of characters and when you put those two" this is saying this whole thing is one string. One string is a variable. Do you understand the difference? It is a constant. There happens to be a string of characters. Now, you don't want to print welcome and you want to print welcome cutie, well you type welcome cutie. It's another string of characters. What is this here? there is something funny here. There is print, parentheses, there is a F, there is a quote. And inside of that, it says CS, bracket, X. This is a little bit more complicated. Yeah?
>> STUDENT: Well we know if we put something in quotations it means a string of characters.
>> PROFESSOR: Stop right there. That's great. If we put something between quotes it means
a string of characters. Yeah? Overhead.
>> STUDENT: We have 210 which is the first number. Before X. So maybe Python is saying keep this X variable.
>> PROFESSOR: Very good. Your name? Alex. Alex gave a fantastic answer. Let me see if I can encapsulate the brilliant answer. That was brilliant. Look at the way he passed this statement? It is important to parse statements in the proper way. He said we know between
quotes means - -. What I put between quotes must be a straight. Yes? However, right there it says CS and if you look at the Apple on the right-hand side at CS, not CS gets printed. Here you say math, here he would put math. The difference with this now, this is in brackets and these brackets contain X but X was a variable. Yes? The value of that variable at this point in time is 210. So these are replaced by 210. The whole thing now says CS 210 and this aft means printed in a formatted way. Printed nicely. Usually when you put F you put quotes after that. Question? Raise your hand if you do not understand

this. Raise your hand if you do understand this. Okay. Coming back now to his question, he was asking what is the difference between this and this? Open your eyes carefully and look at the two boxes. The box on the second example and the box in the last example. By the way, open your eyes. Look at the two boxes and you should be able to detect there is a difference. Anybody? Only one? Only two? He says that there is no FDOT The difference between this box in this box is here there is F and here there is no F and look at what happened. Can you explain? This is treating this whole thing as a what? As a string of characters. This is CS bracket X. This is ever awake before printing. Tell me your name.
>> STUDENT: My name is Rochon.
>> PROFESSOR: You are very active, that's good. What happened with the people in the back?
How is the card game going? Are you winning? Okay. The way to learn this, to know Python, look at these examples and here is the program. Here is the output to set it up. That we would be able to understand the differences. I want to make sure that there are certain details in Python that are, to me, as an old man, very painful. It's painful for me, maybe not for you and that would be great. But this is formatting. I am putting the quotes in the right place. That is something you have to deal with. I'm not going to be spending a lot of time in class going through these figures. What we will be providing to you as examples so you can understand the difference. I hope, for example, that you were able to, this is a question. So go fill the output this produces or the output that is produced. That would be the way the ZY book will help you understand what's happening. It
will show you something, the piece of code and ask you, what is it? It will tell you wrong or right. If it is wrong and you can do it again. That is the purpose of it. This is a little bit more complicated. This is what we explain about what is an interactive Python interpreter. You put the start somewhere. A bunch of lines in Python. You can type after you install the interpreter. But, how? You have to start. In order to start you have to open the console, the interpreter and for this window you would type CMD. Type Python and
when you see these arrows you are ready to start. You type terminal CMD for Commandant to
open the console he would see a different symbol for Python and when you see this you are
ready to go. After you have this you can start typing the instructions whenever you want. You type this, why equal to 10, you get to 10, print welcome. You get welcome. Print that you get - -. Okay. Suppose that you store correctional instructions or program. And you code that whatever you want,. PY, meaning it's Python. That's all. This is the same thing we have been saying. This goes here, blah blah blah. I think this material is printed at such a level of detail that I believe my grandmother would be able to follow. You guys are little smarter. Okay. You want to go into Python interpreter mode after you've installed interpreter mode, which is line by line. Then you would have to open your terminal console. And we told you how to open that. That is one mode of execution. And

suppose that you develop a Python program and you want to run the whole program but you
don't want to run and line by line. One analysis telling you how to run a Python program.
Okay. So you have a text file. An WP Y, this tells you how to run the whole program.
This has 1000 lines, it will run the thousand lines. Python is still, we talk about it.
Okay. Why is Python so popular? Yeah? Because it is simple. I'm happy to hear that.
You will do very well in the class. I want a more sophisticated answer. Why is Python popular? What? He says straightforward. Simple, straightforward, those answers are too generic to me. Yeah? In fact, the answer is on the screen. Because there are loads of so-called libraries. A library is, nothing ends in a collection of programs. Mathematical libraries. That to a lot of starts that you learned in calculus that our programs already written for that. You want to compute the interval or something, you input the function. And now the computer integrates for you. So that the mathematical libraries, there are also plotting libraries. You have a bunch of data you would like to plot. His very simple. He put that in the file and say plot. Depending on the library. You get the file name and now you have a plot. You want the programs provided to you. There are different
libraries, collection of programs. People maintain these. And these are free. You can access them at any time to use in your code. So you don't have to start from scratch.
That is one of the main reasons why Python is so popular. And we mentioned things you can
interact with. CSV, what is a CSB, by the way? What is a CSB file.
>> STUDENT: [Away from mic]
>> PROFESSOR: The C stands For? Comma. S is separated and V is values. How many of you use CSV values? What is Jason? Same guy? The other people are. Anybody? Loud, loud, loud.
>> STUDENT: One of the most popular ways for applications.
>> PROFESSOR: Right. JavaScript is a language for applications and there are classes here that operate with JavaScript a lot. So it is a way to describe objects for that language.
Language is very useful. This is the library that allows you to generate random numbers.
When this is useful to be able to generate random numbers? Just mathematicians playing games with random numbers? Playing games? I have the same people. One, two. The people
playing the card games are completely gone. Tell us.
>> STUDENT: Random chance?
>> PROFESSOR: Random chance you say? I don't know what is random chance. Random chance,
you mean?
>> STUDENT: Gets just random.
>> PROFESSOR: The question on the table is why we need random number generators. New guy,
yes. Tell us. Computer security, yeah but that is one important application. Or random

number. The main idea there is do you know about public topography? What the heck is that? Okay. It's basically, in order for me to communicate with the gentleman there in the back we can have an agreement that there is something called a public key. And something called a private key. I have my private key for me, he has a private key for him and there is a public key underway to combine the public key with low private keys so that she will not be able to fake me or my identity. It happens to be that this combination uses random numbers behind. Big random numbers. We are speaking of something like 240.
Sometimes thousands of digits in a random number. So that is one application. Thank you for that. Give me another, more mundane application. I have the same person. Whoever tried to these people in the back? You guys should not come. Why are you wasting your time? Why do we need random generators? What?
>> STUDENT: To get random output.
>> STUDENT: Mine is kind of like his answer but it's like two people have Social Security. A lot of stuff.
>> PROFESSOR: Speaking of Social Security numbers? Random, random. These numbers are not
random. But it is an interesting thought.
>> STUDENT: [Away from mic]
>> PROFESSOR: Louder, please.
>> STUDENT: He want the program to give the same output every time. [Away from mic]
>> PROFESSOR: You mention a classic example. Flipping a coin. In order to simulate processes like flipping a coin, you don't want to flip a coin - - like flipping a coin. In looking what's happening. No. You use the random number generator that simulates flipping
a coin. The main use of random number generators besides picked auger fee is to simulate processes that otherwise are very difficult to understand. When this is used all over the place. You will have a chance to experiment with some of these random number generators.
Because you can simulate something that you like, social networks. You can simulate a social network. By using random number generator. Who do you talk to? Yeah, my friend. My brother. Yeah, but when you want to study a whole society, the only way to simulate that is by generating random number. Yeah?
>> STUDENT: You get like samples.
>> PROFESSOR: What is your name? Hanley. That is a beautiful, beautiful, beautiful, beautiful answer. You are using the context of data science. But in general, when you have data, not just in data science. Data. It needs to be, it's happening right now. In the election process. 275 billion Americans, who would you like, this guy? This guy? This guy? You have to make a sample. And to make that sample you have to use some randomness. We may talk about that at some point if we have the time. But that is another use for random numbers. It is very important. NumPy has PY at the end because it is Python. It is a lot of computations with scientific functions. As a plotting library.

Very easy to use. Interactive with some other stuff. Scientific computers, this is today. One very important library that is used in machine learning. Who can tell me what is machine learning? In one phrase? The way that talks about machine learning.
>> STUDENT: Artificial intelligence.
>> PROFESSOR: Artificial intelligence, machine learning is part. Of artificial intelligence. Yeah. Artificial intelligence is better than not. Yeah. Incremental learning. That's part of machine learning.
>> STUDENT: When a program - - [away from mic] further actions.
>> PROFESSOR: That is part of machine learning. What? Back there. Too generic of an answer. Is there a machine? Machine learning. Is there machine learning? Is there a piece of hardware? No. No. Not necessarily. No. This word, learning. What the heck is that, yeah? That is a very nice answer that is just part of machine learning. Using statistical models to make inferences from data. Say that again. Because you are hitting a very important point. Okay. Do you guys know what algorithms have? What are algorithms? Give me one phrase description of what algorithms.
>> STUDENT: In one phrase?
>> PROFESSOR: In one phrase.
>> STUDENT: A set of instructions for machine to execute.
>> PROFESSOR: A set of instructions for machine to execute. Isn't that a program, like Python? Is that an algorithm?
>> STUDENT: Step-by-step instructions.
>> PROFESSOR: Step-by-step instructions for what? Telling a computer what to do. Close but not quite.
>> STUDENT: A set of instructions to solve a specific problem.
>> PROFESSOR: A set of instructions to solve a specific problem. By who? To solve the problem by who? By your mother? Your aunt? By your brother? By your boyfriend? Girlfriend? Set of instructions by who? What? Why does it have to be a computer? Set of instructions to solve a problem by a computational agent. Maybe a computer. May be a human. Maybe a program. So machine learning is really a collection of algorithms. That are produced by programs. The difference between the past and today is that before you will have people like me to design algorithms. We have this problem and we need to do law law law in this way. We need to create this algorithm, it's very efficient to do this.
That was a description of the task. The difference today is what you do is collect a lot of data. You fit this into an algorithm. That takes the data and produces an algorithm. That later on when somebody brings some other data that algorithm knows what to do based on
previous experience. What to use behind-the-scenes? Mathematics. Computer science. Why
I mention that is because at the end of the day machine learning is becoming, that's a problem. But never mind. It is becoming a collection of boxes. And these boxes are called machine learning models. It is just a name. It is a box that is trained to deal with certain particular set of problems. And there are many sized boxes. Then we have a

new program. You have to decide which box to use. And how to put them together to create
a metal box. A more sophisticated box. Okay. This is starting with this idea of libraries. Libraries are pieces of knowledge that are already programmed for you. And whatever task you want to complete you can decide which library to use. Machine learning has on a midsized a lot of this. So this final library is used a lot in machine learning. Okay. What is a Python script? We talked about not. And those of you that said, and raise your hand, that you know Python. Well enjoy yourself by looking at this little piece of code. For everybody else, you should look at these pieces of code and understand what this is doing. And look. Here we are using something called random. So in general when you want to use something from a library in a Python program. At the beginning. Youwrite imports and you write the name of the library. And that library contains a collection of functions that are already compiled and ready for you to use. This is an example of the random library. And now, here, the I in this range you are going to call that library random. You're going to call within the library a particular function called random integer. Between this and this there is a dog. This is the name of the library .the name of the function within the library. Within that, it uses that function and generates a random integer. In this case between three and 80. That random integer is appended to the
data have created. If you understand the processing of this instruction I think you are already ahead of the game. Raise your hand if you understand this box here. Oh, what happened with this? That was with the sign. Every value. What is the name of a box like that? A box, a box. This box. I'm talking about this box. When I say this box I talk about this box, the yellow box in this piece of text. How do you call something like that? Only one person? There's a whole bunch of people that said they know Python. Where are you guys? It's a for loop. The name of that is a for loop. The important thing here is the word loop. Loop. What does that mean? What does loop mean? No. Because programs are repeated when they are in loops. I'm going to loop, I'm going to loop. I'm going to loop. Hi, how are you doing? I'm James. Hi, how are you doing?
>> STUDENT: Good how are you?
>> PROFESSOR: Hi, how are you doing? I am looping to do all of you guys. So how are you? I'm not going to continue but that is looping. What looping means? Traversing a sequence. A collection of objects. By the way, how are we doing with time? We are out of time? Oh my gosh. I was having so much fun. So to the presentation.