(Track 1 is copyright information.)

Unit 1: Architecture: Applied Science

Track 2: Listening 1 (Information): Getting the Information You Need

Student: Hello, Cecilia.
TA: Come on in, Scott. What can I do for you?
Student: You said Dr. Bunting’s lecture was one of your favorites. I’d like to hear more about that.
TA: Sure. My favorite part is about Vitruvius.
Student: Can you spell that name for me?
TA: V-i-t-r-u-v-i-u-s.
Student: Okay. I got it. Tell me more.
TA: His name, his full name was actually Marcus Vitruvius Pollio, and he was Roman. What is believed to be one of the earliest written works in the field of architecture was written by him, in the 1st century.
Student: Did you say the 1st?
TA: Yes.
Student: Wow. That’s interesting.
TA: I think it’s interesting, too. He believed that a good building should fulfill three rules or principles: durability, utility, and beauty.
Student: Really?
TA: Durability means the building needs to last a long time.
Student: What is an example?
TA: Notice how some buildings in Athens or Greece are still standing? They meet Vitruvius’s standard of durability.
Student: I didn’t hear that second place you said. Will you say it again?
TA: Greece. Athens and Greece.
Student: Thanks. Please go on.
TA: The second rule is utility, meaning the building needs to be utilized or functional to the people who will be using it. The last rule is beauty. He believed that the buildings needed to make people happy by the way they looked.
Student: So you like Vitruvius because he developed rules?
TA: Yes, but it’s more than that. He created these rules, but they’re rules that have lasted through the centuries, and they are still used today.

Student: Cool. Thanks for talking with me.


Track 3: Listening 3 (Lecture): Construction and Structural Engineering

Professor: Good morning, class. Yesterday, we talked about what buildings look like from the outside and what we find appealing visually. Many people consider that to be the part of the construction process that is actually fun!

Today, I want to talk about some concerns an architect or engineer has to think about during the construction of a building and also discuss two approaches to constructing a building.

Today, the environment is a concern for new construction. Many people want to know what impact the building will have on the environment. In the past, we were not aware of the ozone, and we did not know about the consequences of trees being cut down for developments or about other environmental issues. But today we do know about these things, and sometimes a formal report on the impact is requested.

Meanwhile, planning is also a task: the schedule, budget, location, and materials all have to be determined. All of these things are studied in detail to make sure the project can actually become a reality. In other words, if an engineer can’t get the materials needed to make the building usable, then the project can’t begin. Right now, environmental reports are not part of the planning process, but, in the future, I believe they will be required. Perhaps they’ll be done while other details are planned, or maybe they’ll be done before other planning can even be considered.

Planning is so important. What if some material you were planning to use wasn’t available or was too expensive? What if the location was considered a bad risk for the environment? Or worse yet: What if the building ended up not being usable in the end?

Traditionally, the most common method had always been the design-bid-build method. You could abbreviate this as D-B-B. The architect or engineer is the coordinator of the entire D-B-B process. It is his or her job to design, determine the specifications, produce drawings, hire the best contractors or builders, and manage the entire process from beginning to end.

Today, a slightly different approach is being used. The design-build method—notice this is D-B rather than D-B-B—is a little different. In this case,
the D-B tasks are taken on by a design-build contractor, usually an architect or an engineer. This new approach is less risky because rather than designing everything and then building and hoping for the best, the design and building phases overlap. In other words, while one phase is being built, another is being designed.

When might this D-B approach be the better choice? Well, perhaps for a really large project, right? Or, maybe for an expensive project and where maybe all the money hasn’t come in yet. Think on a small scale for a minute. A client at your architectural firm wants to build a house and a two-car garage. He has enough money for the house but not enough for the garage. You, as the architect, would probably design the house first. Then, you start the construction. Meanwhile, your client has gotten funding for the garage. Then, while the house is being built, you will design a garage.

Structural theory is now the third concern, in addition to the environment and the planning. Today, architects or engineers need to understand the theory of structures and know how they will endure through time. Consideration is given to the overall structure—columns, beams, arches, and so on.

As we move forward in this course, we’ll talk about how many of these items—columns, beams, arches—can be categorized by form, whether straight or curved, or dimension, one or two. Let me give you a bit of general information now so you can really see some of the science involved. Ah, the focus on structural theory is likely to remain important well into the future because it’s a priority to make buildings that will last. Think of recent natural disasters we’ve seen lately—hurricanes and earthquakes—and the types of structures that have endured.

Focus on columns for a moment. The architect or engineer must think about the axial force and the buckling capacity when adding a column in a building. The buckling capacity is how much the column can take without failing. To figure this out, many factors are considered: first, its shape; second, the material; third, its length; and fourth, the weight on it. What is that column holding up? And what is that column resting upon?

As you can see, we’re going to have to use some equations and math soon. We’re running out of time now, so please read about columns and beams—the other design element that, like columns, is represented by simple lines in most drawings. I’ll see you in class tomorrow.
Unit 2: Marketing: Product Management

Track 4: Listening 1 (Information): Listening for Advice

Professor: So you wanted to talk about how you could do better in my marketing class. Correct?
Student: Yes, that’s right. I want to get a good grade.
Professor: You should read the information about branding in the textbook. Have you done that yet?
Student: No, not yet.
Professor: Well, you had really better do that. There is information in the book explaining the importance of branding, and this isn’t something we’ll have time to cover in class.
Student: Can you tell me which material in the textbook I should be sure to focus on?
Professor: Sure. I wouldn’t memorize the statistics. If it were me, I’d concentrate on brand awareness. I’d think about how important it is to have a symbol that people recognize even when people see it out of context. In other words, even if you’re in Italy and you don’t know Italian, you would recognize the golden arches and know that it’s a McDonald’s, right?
Student: Right. Ok. Anything else?
Professor: You should remember that brands are not just symbols or logos, but also jingles.
Student: Those are the songs or catchy phrases, right?
Professor: Exactly. Do you want some other ideas?
Student: Yes, definitely. I’d really like to do the best I can in your class.
Professor: Have you bought the study guide for the book? You could get a copy and use that to study.
Student: No, I didn’t get it because it cost more money.
Professor: Maybe you could borrow a copy from the library. Or you could use my lecture notes that are posted online. You shouldn’t buy a used copy because those usually have someone else’s marks and that’s not a good thing.
Student: Ok, thanks.
Professor: Another thought is that you might want to go to the business seminars in town. The city business council brings in speakers every month on a variety of topics. Listening to those will give you more information about lots of marketing issues.
Student: When are those?
Professor: The first Monday of every month. Oh, another idea: See about getting a tutor from the business department. The tutors have taken most of my classes and know the material. One other thing: You might want to look at the list of extra credit assignments. They’ll take time, but some are worth up to 20 extra points. Those can really help improve your overall grade.

Student: Great! Thank you very much for your time, Professor.

**Track 5: Listening 3 (Lecture): The Marketing Mix**

Professor: Good afternoon, class. Everyday, people are hit by advertisements. Some are very obvious, such as commercials on television or advertisements on the radio. Others are less obvious but still make an impression on us. For example, we see billboards or in-store advertisements. Sometimes we may not even think about how we’re being targeted. Perhaps you’ve gotten a stack of coupons in the mail or you see a flyer for a new product posted on campus. The rise in technology has given a new meaning to advertising with pop-up ads that appear in boxes when we click on a certain website. This variety is part of the marketing mix.

The marketing mix consists of four parts. They’re easy to remember because they all begin with the letter P: Product, Price, Place, and Promotion. This mix is not new. In fact, it’s been around since 1960 and has been widely accepted thanks to a well-known marketer, E. Jerome McCarthy. You’ll see this concept well documented in your textbook and in most marketing textbooks in print. And, I’m not sure there’s a marketing class anywhere in the world that won’t at least mention these.

What does that first P stand for? **Product.** The product is the actual item you’re trying to sell. It could be an item like shoes or a cup of coffee. Additionally, the product could be a service—a tutoring service or transportation service. It doesn’t matter what it is, only that you’ve identified it as the product you’re selling. Included in this P is **packaging.** What kind of package will your product have?

Ok, now the second P is **price.** How much is the consumer going to pay for the first P, the product? A marketing manager needs to consider the competition, costs, and branding. Furthermore, that manager needs to think about how the customer feels about the product. After all, if the customer doesn’t think that the product’s value is as high as you do, then he or she won’t buy it. Even though you value that pair of shoes at $100, the customer may not.
The third piece of the mix is place. Don’t be confused by this. This is not the place where the product is advertised. Rather, this is the place where the product can be bought by the consumer. This could be a store, but it might also be a website or a phone order called in after watching an infomercial on television.

Moving forward, the fourth and final element of the mix is promotion. Promotion is the communication a marketing manager uses in the marketplace. Although this includes other things, such as public relations, I want us to concentrate on advertising. Advertising is my next main point.

Advertising includes any communication the marketing manager pays for. Think back to the list I gave at the beginning of the lecture, but also think about conferences, sponsorships (actors and athletes must be paid for selling that product), there are seminars, the woman who sprays you with cologne at the department store, newspaper advertisements, signs on buses, signs on bus stop benches. Well, you see where I’m going, I hope.

My last main point for today is about covert advertising. This is the advertising that people may not even realize is advertising. Usually these are part of something we’re watching, and we don’t really think about someone paying to have it included. Think about movies for a moment. Sometimes actors will mention a specific brand or they’ll be using a computer and you can clearly see what kind of computer it is. That’s an example of covert advertising. More examples include the new world of gaming. Next time you play your video games, notice how the driving games have billboards that you’re driving by or how in the Second Life you see billboards for specific products or have stores to shop in. Maybe you’re not really driving by a real billboard or shopping in a real store, but you are being exposed to real advertising.

Okay then, make sure you read the section on covert advertising in your textbook. I’d like you to observe some covert advertising and share it with the class next time so maybe it won’t be so covert anymore.

Unit 3: Earth Science: Earth’s Composition

Track 6: Listening 1 (Information): Listening for Interesting Facts

Student: Thanks for meeting with me, Chris.

TA: Sure, no problem, Andrew. What can I do for you?

Student: Well, I’d like to know more about today’s class. We talked a little about the national spatial reference system, and I wonder if it would be a good topic for a research paper. I thought you could maybe help me find something interesting to focus on.
TA: Hmm. Yeah, maybe. Well, the elements of the NSRS has been used to map the shorelines and land boundaries in the United States and improve transportation. Let’s see. Well, you know, most people believe the idea of mapping the Earth is fairly new. But, believe it or not, the National Geodetic Survey has been at it for more than 200 years.

Student: Really?

TA: Mm hm. NGS came to be from another agency, the Survey Coast. And what I find most interesting about that is that it was started by Thomas Jefferson, the third president of the United States, in 1807.

Student: Why did Jefferson start the agency?

TA: Well, this sounds strange since the United States was basically a new country, but he started the agency because the country was realizing how important buying and selling was going to be. Much of the commercial trade was going to happen via the waterways.

Student: Oh, interesting.

TA: Yeah, and interesting to me is how the agency has endured over time. So, once the nation grew and started expanding to the West, the agency began surveying the land too.

Student: How did everyone share information?

TA: Well, the surveyors realized they needed one common set of points so that they could make sure their maps wouldn’t overlap with others.

Student: Did they succeed?

TA: They did. They created a set of benchmarks from the horizontal and vertical datums. Surprisingly, these too have endured. Today, that complete set of benchmarks is known as the NSRS, which stands for the National Spatial Reference System. The name itself isn’t that interesting. It’s what we do with it now.

Student: How do we know where those markers are anyway?

TA: Well, the markers are marked.

Student: Marked?

TA: Yeah. There is some sort of permanent fixture, usually a disk made of metal, placed where the agency has determined a point to be. This system has since been updated. And since GPS has become so widespread, a different marker is used.

Student: What is it?

TA: Well, it’s still metal, but oddly enough, it’s a rod instead of a disk. The rod is made from steel, and it’s long. It’s pushed into the ground as far as it can go. The top of the rod is then covered with
a metal plate. This method is safer. People can’t move it or hurt it. It’s then included in the database and anyone can use it.

Student: Anyone?

TA: Yep. Anyone at all. Do you realize that GPS could take us well into the next 200 years? We now use these points to make maps of both land forms and roads. Do you have a GPS in your car? Think about how every road in the world became part of GPS.

**Track 7: Listening 3 (Lecture): Types of Rocks**

Professor: Good morning, everyone. We’ve been talking about rocks and how they are always in a state of change. Wind and water change their shape and location. Today, you can find rocks that were formed under the sea in areas that are now land. Rocks that you find outside this building might have been formed deep below the crust and only made their way to the surface after millions of years. Remember, the Earth is more than four billion years old. Most rocks have been here longer than any of us.

As I mentioned during our last class, there are thousands and thousands of rocks, but most are made from only eight elements. Specifically, those elements include things like oxygen, aluminum, calcium, iron, and sodium. However, it’s not those elements that I want to focus on today. I want to talk about the types of rocks.

There are three basic groups: igneous, sedimentary, and metamorphic. They’re classified by how and where they’re formed. I’ll talk about how each is formed, where they’re found, some of their characteristics, and examples of each. If everyone is ready, let’s dig in.

Let’s begin with **igneous** rocks. Most people associate these with volcanoes. And, they’re right. Igneous rocks are formed by rock that has melted, then cooled, and then hardened back into rock. The rocks are actually deep below the Earth’s crust when they melt due to the high temperatures and high pressure. When that happens, the liquid rock moves upward. In some cases, it then erupts from a volcano. At that point, the molten rock begins to cool. It forms extremely small, fine-grained rocks. There are different types of igneous rocks, depending upon how fast they cool or depending upon the components of the molten rock before making their way to the surface. Examples of igneous rocks are: obsidian, granite, and basalt.

The second group is **sedimentary**. Contrasting those with igneous, sedimentary rocks are made at the surface of the Earth rather than deep down. Believe it or not, these can be formed on land or in water. Contrasting with igneous again,
these are not made of molten rock but are made of accumulations of materials, or sediments. What I find interesting is what they are made of. They could be made of any of the following: pieces of other rocks, minerals, animal parts, or plant materials. Whereas igneous rocks are formed from high pressure, sedimentary rocks are exposed to relatively low temperatures. They’re held together by an electrical attraction if they’re held together at all. Surprisingly, these rocks are actually very loose—they barely hold together sometimes. The layers of sedimentary rocks are parallel to the surface, but you might notice some that some rock formations are at unusual angles or are broken. Interestingly enough, this indicates that the Earth moved, maybe by an earthquake, and that broke the rock. There are many examples—chalk, limestone, coal, and sandstone are all sedimentary rocks.

The last group is metamorphic. Oddly, you couldn’t have metamorphic without igneous or sedimentary. What do I mean by that? Um, sedimentary, metamorphic rocks are created from one of those two types of rock being exposed to so much pressure or high temperatures that they completely change. In other words, they’re no longer igneous or sedimentary. The only place to get that much heat or pressure is very, very deep in the Earth’s crust. The rocks don’t melt or become liquid; they actually become more compact rocks. Remember, sedimentary rocks are kind of loose. Although they start deep in the crust, the crust moves and over time, metamorphic rocks eventually make their way to the surface. There are many types of metamorphic rocks, such as slate, jade, or marble.

I see we’re running out of time, but read more about the rock types in your textbook, Chapter 5, and I’ll show you some actual rock samples in the earth science lab tomorrow.

**Unit 4: U.S. History: Presidents**

**Track 8: Listening 1 (Information): Listening for Guesses**

Student 1: Hi, Michael.
Student 2: What’s up, Andrea?
Student 1: Well, I was thinking about studying some of that information from history class today. Dr. Sarrazin asked us to bring ideas about what made Abraham Lincoln one of the greatest presidents in U.S. history.

Student 2: Hey, mind if I join you? We could compare ideas.
Student 1: Sure. Ok, so I think it’s partly because Lincoln didn’t have an easy life. His parents were just average people, and he worked on a farm. He didn’t get to go to school because he had to work.
Student 2: Right, right. Dr. Sarrazin said Lincoln tried to get more and more knowledge by reading on his own the whole time he worked on the farm. Remember he also said several presidents had things in their early life that were difficult and that prompted them to do a lot of readings on their own.

Student 1: And he became a lawyer, didn’t he?
Student 2: Yeah. That might be one reason he became such a good president. I’m not sure, but I think Dr. Sarrazin said that it was his law partner that once claimed that Lincoln’s ambition never took a rest. I think Lincoln worked in the smaller courts in Illinois also.

Student 1: Hmm. His greatness could also be due to his ability to get through hard times.
Student 2: What do you mean?
Student 1: He married a woman named Mary Todd, and they had four sons. But I think that only one son lived to be an adult. Two died when they were very young, and only one lived to be 18.

Student 2: I’d guess that enduring something so sad can make you a strong person.

Student 1: Plus, he lost his election for Senate to that Douglas guy. Do you think his political experience helped make him a good president?
Student 2: Maybe it played a role. He was in the Illinois legislature for eight years. Perhaps it was his ability to be a great public speaker. People take notice of good speakers. Even though he lost that election to Douglas, people still remember the debates, and there’s, of course, the Gettysburg Address.

Student 1: Yeah. I’d say we need to focus on the time he was actually the president. After all, he was serving at the time of a war that had completely divided the country, and that could not have been easy. He was worried the country might not survive. Lincoln issued the Emancipation Proclamation that freed the slaves. How can Lincoln not be considered great for that?

Student 2: Yep, all of that is true. Then he was re-elected before the war ended and then shot only a few weeks later. It’s too bad—he probably could have done more had he lived longer.

Student 1: It was an actor, wasn’t it? An actor that assassinated Lincoln?
Student 2: Yes, it was. John Wilkes Booth shot Lincoln at Ford’s Theatre in Washington. April 14, 1865. I think Booth thought he was somehow helping the South in the Civil War.

Student 1: That’s incredible. Well, we’ve talked about Lincoln being a hard worker and ambitious, being a lawyer, enduring tough personal and professional times, and being a good speaker and leader at an
important time for the country. What should we tell Dr. Sarrazin tomorrow?

Student 2: We have too many answers. My guess is that there isn’t just one right answer. But, if I had to choose one, I think we should go with his ending slavery and reuniting the country as one after the war.

**Track 9: Listening 3 (Lecture): John F. Kennedy’s Legacy**

Professor: Ok, let’s get started. As I mentioned in our last class, we’ll be talking about John F. Kennedy today and some of the events that took place and decisions that were made during his three years—actually exactly 1,000 days. The first two significant events—starting the Peace Corps and being against war—were alluded to during his inaugural address as he was sworn in. The other decision I’ll talk about is the space program. But, we’ll get to that in a while.

So, Kennedy gave many famous speeches, but one memorable quotation that many Americans to this day can quote directly came from his very first speech as President of the United States. Kennedy said then that all Americans needed to be active citizens. His famous words were, “Ask not what your country can for you; ask what you can do for your country.” As a result, one of Kennedy’s very first acts as president was forming the Peace Corps. Kennedy had actually first mentioned this program while campaigning in 1960 at the University of Michigan. The idea here was that Americans would volunteer to help other nations, usually those not as developed as the United States, with things such as agriculture, construction, health care, and education. Peace Corps volunteers have college degrees and help fulfill the goals of the Peace Corps. This program that promotes world peace is still popular today. The Peace Corps Act was passed on September 22, 1961, and since then, more than 200,000 Americans have joined the Peace Corps and have served in more than 130 countries.

Ok. Kennedy also asked other countries to join him in the fight against the “common enemies of man.” This phrase was also from the inaugural address. What did he consider common enemies? Several things: tyranny, poverty, disease, and war. Let me focus for a few moments on the last common enemy he mentioned: war. Kennedy didn’t want the country to be at war. This was partly because he had seen war firsthand, but there were other reasons. This is what he said in his speech:

“But neither can two great and powerful groups of nations take comfort from our present course—both sides overburdened by the cost of modern weapons, both rightly alarmed by the steady spread of the deadly atom, yet both racing to alter that uncertain balance of terror that stays the hand of mankind’s final war.”
Kennedy was very worried about nuclear weapons and radioactive contamination. To further prevent contamination by nuclear weapons, he suggested the Partial Test Ban Treaty. This treaty stopped the testing of atomic bombs on the ground, in the atmosphere or air, or under the water. He owed partial success to the United Kingdom and the then Soviet Union since they signed the treaty with the United States in August of 1963.

Now, onto space as promised. Kennedy was supportive of space exploration and wanted the United States to be a leader. Due to the Soviet Union’s successes, like Sputnik in 1957, Kennedy approached the Soviet Union about a joint venture. Nothing really happened, but he continued to develop his vision for space exploration. He announced this goal to a Joint Session of Congress on May 25, 1961, and then in a speech at Rice University in Houston on September 12, 1962, which has become famous, he said that the U.S. had an obligation to “be first.” He acknowledged that it would be a difficult thing but that we had to accept the challenge of it. These lines are famous: “We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard” . . . “because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one we intend to win.”

Although Kennedy did not live to see it, his dreams of U.S. space exploration were fulfilled. Six years later, the goal was realized when men set foot on the moon in July of 1969.

I’d like to discuss Kennedy’s positions on war and stopping the spread of communism, including what historians think would have happened in Vietnam had he not been assassinated, but that is for another day. So continue reading about these events in your textbook. Actually, as you can see, quite a few things happened in those 1,000 days, didn’t they?

**Unit 5: Chemistry: The Elements**

**Track 10: Listening 1 (Information): Listening to an Academic Presentation**

**Speaker:** Good evening. Thank you for inviting me to speak. My talk is called “Hydrogen as Fuel.” This is a very important topic. Please don’t hesitate to interrupt me if you have any questions. First, let me give you a little background about hydrogen. It's the most abundant element in the world, well, in the universe. It's found in water, certain fossil fuels, and some other sources. So, hydrogen can be made from these substances. In other words, hydrogen can be made from water.

**Attendee 1:** How?
Speaker: Well, Hydrogen is connected to oxygen to make water. There are bonds between the hydrogen and oxygen that connect to form the substance of water. If we undo those bonds, we have hydrogen. We can use energy to break them apart. It’s a complicated process called electrolysis. In the end, the bonds are broken, and we get hydrogen. To me, one of the best things we can use hydrogen for is fuel for cars. Most people ask why we should use hydrogen instead of gasoline. Well, there are several reasons. I believe the most important one is related to the environment. Hydrogen produces much lower emissions.

Attendee 1: I’ve heard that, but I’m not sure I know what that means.

Speaker: Ok, here’s how it works. So, emissions are the substances, like smoke or fuel exhaust, that go into the air, usually from manmade things, like cars. Gas for cars produces emissions, but hydrogen doesn’t. When an engine has what we call a fuel-cell engine, it emits only water vapor. So, it’s better to use hydrogen.

Attendee 2: Can you say more to explain why?

Speaker: Sure. It’s better to use hydrogen because burning other types of fuel produces bad emissions. Bad emissions include carbon dioxide, carbon monoxide, hydrocarbons, and other toxins. Therefore, in a car with a hydrogen-fueled engine, only heat and water are made. And that’s definitely better for the planet. To my mind, the next car everyone buys should have a hydrogen fuel-cell engine.

Attendee 2: I need a bit more information. Would I buy hydrogen instead of gasoline?

Speaker: Uh huh. Yep. As I see it, hydrogen will be just like gasoline one day, but the world isn’t quite ready yet. For now, hydrogen stations are used. I believe that one day all current gas stations will sell hydrogen. I also feel hydrogen is a safe as gasoline. It has no smell, no color, no taste, and it’s non-toxic. It is flammable, but frankly, it’s not as likely to become flammable as gasoline.

Attendee 2: Why is that true?

Speaker: Well, hydrogen can catch fire, or ignite, with less energy. But it needs a larger concentration of hydrogen and oxygen to burn. It’s light and it floats. And, therefore, it moves into the air quickly. The larger concentration doesn’t develop because it moves so quickly into the air. As a result, getting a large enough amount to make it flammable is, well, rare. There are a lot of safety systems in place in hydrogen-fuel systems. The sites that are already using large amounts of hydrogen for making products have a very good safety record. In my opinion, more and more people should be using it.
Attendee 1: Well, what are your thoughts on what the price of hydrogen will be for the average customer?

Speaker: Well, I think it’ll eventually be the same price. Like I said, hydrogen is already used today for many other things. It’s used in a lot of industries, such as metal or chemical plants to make things like fertilizers, glass, soap, and even some food items . . . peanut butter. It’s a matter of broadening its use to cars to help cut back on emissions and really help the environment. Personally, I think most car makers will eventually sell hydrogen-powered cars. In fact, some already have done a lot of research. Someday you’ll see the results.

Track 11: Listening 3 (Lecture): Ocean Acidification

Professor: Hello, everyone. Today I’m going to talk about ocean acidification. What is it? Ocean acidification is the fall of pH in the Earth’s oceans. Remember that pH is how much acid a solution has. Solutions with a pH less than 7 are said to be acidic.

Keep that in mind as I spend a little time talking about the rate of acidification. The decrease of pH in the oceans has started, and it continues. In the 1700s, before industry was such a big part of the world, the pH in the oceans was about 8.179, almost 8.2. Since then, the world became much more industrial and modern. In the 1990s, the pH was closer to 8.104, much closer to 8.1 than 8.2. Currently, in the first part of the 21st century, the rate is down to something like 8.069, and it’s expected to keep dropping to perhaps 7.949 by the year 2050. The oceans are getting more and more acidic. It seems like a small drop, but many scientists are concerned. If carbon dioxide, or CO₂, continues to rise, then pH changes can be some three times greater than those during the time when glaciers covered the earth. The chemistry of the oceans is definitely changing.

Now, how does this happen? The industrialized world and more and more modern conveniences have increased the amount of carbon dioxide. Humans are producing millions of tons of it every day, and the ocean is absorbing it. When it dissolves in sea water, the amount of hydrogen ion concentration rises. As a result, the pH falls, and ocean acidification happens.

Shift your focus now to the possible impacts these chemical changes could have. Unfortunately, most of them are negative. A falling pH makes less carbonate available. As a result, it is hard for some marine animals to make their shells or skeletons since they are made from calcium carbonate or CaCO₃. Some animals that are affected are mussels and snails. Not only does it affect the animals and how they live, but it could also affect the food chains, what animals are surviving off other animals? If one animal species that is the food source for another disappears, won’t another be forced to change, or worse, disappear?
By the way, this could also affect other marine life. Coral reefs won’t be able to grow as quickly. They will also be more delicate, and they could erode faster. What will happen when the reefs are disappearing faster than they are being made?

On a different note, how does this affect humans? I mentioned one type of marine life affected might be snails. Snails are a delicacy that many people like to eat. Acidification could affect the food industry, both for the people who fish and who work in the industry and the people who cook, serve, and eat seafood. And the coral reefs eroding could cause problems for humans too. Right now a lot of money is spent by tourists who want to see the reefs. If there are no reefs to see, then tourism dollars will fall, and many areas that depend on the tourism dollars will suffer. One other way this could affect humans is if the ocean can no longer take in any more carbon dioxide. If it doesn’t go into the ocean, then it stays in the air. This then makes the subject of climate change even more important.

This makes me think that I should mention the pH scale. Think of the pH scale as 1 through 14. The higher the number, the more basic or less acidic something is. A 7 is pure water and right in the middle. Sea water is usually about an 8, so more basic. Other basic items are ammonia or baking soda. As the numbers fall, the more acid there is. A 5 is equivalent to a cup of coffee. A 4? Tomato juice. A 2? Think of that as, ah, acidic lemon juice. It’s great in a glass of iced tea, but do you want to swim in it? Do you want an ocean as acidic as lemon juice? A lot of people want to stop acidification now before it gets down to a 1, which is battery acid. Think about that this evening, and we’ll continue this topic next week in class.

**Unit 6: Fine Arts: Arts Appreciation**

**Track 12: Listening 1 (Information): Listening for Generalizations**

Museum Tour Guide: Welcome to the Crestview Art Museum. We’re proud to have a new exhibition of statues on display right now. Before we enter the exhibit hall, let me give a brief overview of sculptures and talk about some of the pieces of art you’ll see today.

There are many kinds of sculptures. The Sculpture Hall is filled with a variety of statues. In general, a statue is a representation of a person, animal, or some other “thing.” All the pieces in Halls A and B are statues.

Statues can be subdivided though; specific to our museum, some are people’s heads, and others, the equestrian statues, represent people on horses. The first type of statue is representations of people—their heads and necks. Many people refer to these as “busts.” They all contain those two body parts. Broadly speaking, the chest and shoulders are also part of these statues. However, they vary in
other ways. Some have a large part of the chest and shoulders while others may have just a small part. Most are built on what’s called a plinth. A plinth is a platform; it holds the head, neck, chest, and/or shoulders.

Another type of statue is the equestrian statue. Equestrian statues almost always show a person on a horse. Usually, the person is an important person, maybe a military soldier or a nation’s leader. A few of the earliest American equestrian statues were made of George Washington and Andrew Jackson.

Because equestrian statues are always of a person and a horse, you can imagine how large they are. There are some on display in Hall C, but they’re small compared to the world’s largest equestrian statue planned. That one is the Crazy Horse Memorial in South Dakota. It’s expected to be 27 feet taller than any of the presidents on its neighboring sculpture, Mount Rushmore.

Most of the statues in our display are made from the traditional materials: stone, glass, and terracotta. We do have two made from traditional, but rarer, materials. One is made from silver; the other is made from jade. Many sculptors occasionally try to find new materials to make the typical art form of statues more exciting. A specific example is Picasso, who made a sculpture using the parts of a bicycle. We’re very fortunate to have a few other examples here as well—one made out of car parts, another out of tools, and a third made out of computer hardware. Although they have different parts, you’ll notice that they have one thing in common: Almost all statues are made from materials that are durable because sculptors want their statues to stand the test of time and last long after they’re gone.

If you’ll follow me, we’ll enter Hall A and look at the museum’s collection of head-and-shoulder statues.

**Track 13: Listening 3 (Lecture): Photography**

Professor: Good morning. Today we’re going to talk about photography. I’m guessing that what we have mostly in this room are amateur photographers. Amateurs take pictures of their friends, special events, or vacation highlights. Every time you pull out your camera phone, you are playing the role of an amateur photographer. That’s most of you, right?

Now, maybe some of you will someday be commercial photographers, which means you take pictures and get paid for them. You’ve all probably been to a wedding. Well, the photographer who is taking the pictures is most likely being paid for his or her work. Other types of commercial photographers include fashion photographers or even the paparazzi—you know, those photographers who capture images of famous movie stars at the airport or around town.

It’s also possible that some of you could become an artist with your photography. Artists take pictures for the purpose of art, to have their photographs
displayed in a museum. These photographers are artists just as much as painters or sculptors. It's this type of photography I want to now talk about for a moment—photography that is fine art. There are a few examples of artists that fit this category. Ansel Adams, Andy Warhol—you may remember him from his famous Campbell’s Soup art—or Esther Levine.

Now, let’s talk for a few moments about forms for this type of photography. There are various techniques photographers use. An interesting one is aerial photography. Aerial is from the air. Photographers using this technique take pictures of people, places, or things on the ground from above. They’re in planes or helicopters. Imagine a photograph of the tops of buildings as if standing taller than the clouds or imagine the unique shape of gardens or fields as seen from a plane. There is something to appreciate about those photographs. Another technique is macro photography. Macro photography, loosely defined, is a close up of something. Now, I don’t mean getting close to your friend and snapping a picture. I mean more like capturing a tiny grasshopper on film, and where the photograph makes it look the same size as a person would. Think of some of the photographs you see in a science textbook; those in which you can see the very fine details of the bug—things you’d never see if that bug landed on your desk. A third technique is panoramic photography. This technique usually requires special equipment, but it creates pictures of long objects. Most common is probably those views of a city’s skyline, which I’m sure you’ve all seen.

We don’t have much time left, but I want to touch on numerous technical aspects of photography that photographers need to consider. First, exposure. Exposure is the total amount of light allowed during the time the photograph is taken. Depending on how much light is let in, two photographs of the exact same object can look completely different. Second, depth of field. The depth of field is the part of the object in the photograph that is clear or sharp. It might be that the entire image is clearly seen. In other cases, the photographer might want only part of the image sharp. Last, the rule of thirds. This rule states that any photograph should be imagined as if divided into nine equal squares. The most important elements in the photograph should fall along those imaginary lines or at their intersections. Imagine a photograph of a beautiful landscape. In your mind, draw two vertical lines from top to bottom. One line should be one-third from the left side and the other should be one-third from the right side. Can you see that you now have three columns that are equal length? Now, draw two horizontal lines. Again, one should be one-third from the top and the other should be one-third from the bottom. You should have nine boxes within the square. Which items fall along those lines?

Before our next class, look at three photographs in the current chapter of the textbook. Decide if the photographer followed the rule of thirds. Also, be prepared to discuss what you appreciate about each photograph.