This course supports the assessment for Space, Time and Motion. The course covers 6 competencies.

**Introduction**

**Overview**
Throughout history, humans have grappled with questions about the origin, workings, and behavior of the universe. This seminar begins with a quick tour of discovery and exploration in physics, from the ancient Greek philosophers on to Galileo Galilei, Isaac Newton and Albert Einstein. Einstein's work then serves as the departure point for a detailed look at the properties of motion, time, space, matter, and energy.

The course considers Einstein's Special Theory of Relativity, his photon hypothesis, wave-particle duality, his General Theory of Relativity and its implications for astrophysics and cosmology, as well as his three-decade quest for a unified field theory. It also looks at Einstein as a social and political figure, and his contributions as a social and political force. Scientist-authored essays, online interaction, videos, and web resources enable learners to trace this historic path of discovery and explore implications of technology for society, energy production in stars, black holes, the Big Bang and the role of the scientist in modern society.

**Getting Started**
Welcome to Space, Time and Motion! In this course, you will engage in a seminar with field researchers and educators. This seminar, from the world-renowned American Museum of Natural History, provides an environment for learning and engaging in scientific dialogue. It also serves as the assessment. In order to pass, you must achieve a grade of "Meets Requirements" in the seminar.

*Note:* you must complete the six-week AMNH seminar requiring about eight hours per week of your time. Sessions are limited to specific dates: review the AMNH Calendar to determine when the seminar is offered, and consult your mentor to coordinate this seminar with your schedule.

Review the Assessment Retake Fee section of the Student Handbook: if you do require a third or subsequent retake of this seminar, you will be charged the cost, $400.00 (as of April, 2015; subject to change).

**Competencies**
This course provides guidance to help you demonstrate the following competencies:

- **Competency 2015.1.1: The Development of Modern Physics**
  *The graduate integrates an understanding of the mechanics of motion with how the concepts of momentum, gravity, and motion have evolved from classical mechanics to modern physics.*
• Competency 2015.1.2: Einstein's Special Theory of Relativity
  The graduate analyzes the concept of time and the special theory of relativity.
• Competency 2015.1.3: Einstein's General Theory of Relativity
  The graduate interprets concepts of space, space-time, and the general theory of relativity.
• Competency 2015.1.4: Quantum Theory
  The graduate incorporates knowledge of quantum mechanics and wave-particle duality in problem-solving and teaching.
• Competency 2015.1.5: Thermodynamics and Nuclear Physics
  The graduate evaluates data, research, and theory to draw conclusions about kinetic energy, potential energy, nuclear energy, and relativity.
• Competency 2015.1.6: Particle Physics
  The graduate appraises emergent research in superstring theory, dark energy, and the grand unified theory.

Textbooks

The following textbook is available to you through WGU as an e-text.

Note: This e-text is available for free, but you may purchase hard copies at your own expense through a retailer of your choice. If you choose to do so, please use the ISBN listed to ensure that you receive the correct edition.

Teaching Dispositions Statement

Please review the Statement of Teaching Dispositions.

AMNH Seminar: Space, Time and Motion

Online seminars offered by the American Museum of Natural History (AMNH) use multimedia and discussions to connect teachers and future teachers from around the world to cutting-edge research, classroom resources, and each other. Participating in Space, Time and Motion develops your understanding of the content, models an appropriate teaching technique, and exposes you to an array of resources that can be used in your classroom. This is a required component of the course: the assessment in this course is based on successful completion of the AMNH seminar.

This six-week seminar requires about eight hours per week of your time. Review the AMNH Calendar to determine when the seminar is offered and consult your mentor to coordinate this seminar with your schedule.

To enroll in this learning resource, navigate to the "Learning Resources" tab, click the "Sections" button, and then click the "Enroll Now" button for the seminar. Once your program mentor approves your enrollment, you will receive an e-mail with further access instructions. Contact your mentor if you have questions.
Note: You will receive login information by e-mail directly from AMNH at least two days before the scheduled start for the seminar. Contact your program mentor if you have not received this information on time. If you wish to work ahead, you may begin the readings linked within the pacing guide.

Participate in your course through the AMNH seminar website. You will be assigned multiple readings, videos, discussions, and activities within the seminar. Readings within the textbook are linked here, along with a summary of the competencies you will be building each week.

**Pacing**

Follow the schedule and expectations presented in your seminar. Engage and participate actively in the conversations and activities within the seminar. You may work ahead, but you must adhere to the due dates established by the American Museum of Natural History and the instructors. Begin work on your Final Project early in the course, and continue working throughout so that you can finish it within six weeks.

The following schedule includes the weekly topic and links to the first page of assigned readings from *One Universe: At Home in the Cosmos*. After accessing the etext, click the "Next" arrow to continue reading. Other materials are required and are linked directly from within the AMNH course.

**Week 1: What is Motion?**

- pages 11-22 of chapter 1 ("Motion: Everything Moves")
- pages 161-170 of chapter 4 ("Frontiers: The Limits of Motion, Matter, and Energy")
- Complete all activities in Week 1 of the course

**Week 2: What is Time?**

- pages 41-47 of chapter 1 ("Motion: Everything Moves")
- pages 120-137 of chapter 3 ("Energy: The Power of Cosmic Phenomena")
- Complete all activities in Week 2 of the course

**Week 3: What is Space?**

- Introduction: Our Connection to the Universe
- pages 6-25 of chapter 1 ("Motion: Everything Moves")
- pages 171-175 of chapter 4 ("Frontiers: The Limits of Motion, Matter, and Energy")
- pages 192-201 of chapter 4 ("Frontiers: The Limits of Motion, Matter, and Energy")
- Complete all activities in Week 3 of the course

**Week 4: What is Matter?**

- pages 65-81 of chapter 2 ("Matter: The Stuff of the Universe")
- pages 93-95 of chapter 2 ("Matter: The Stuff of the Universe")
• pages 161-163 of chapter 4 ("Frontiers: The Limits of Motion, Matter, and Energy")
• pages 179-186 of chapter 4 ("Frontiers: The Limits of Motion, Matter, and Energy")
• Complete all activities in Week 4 of the course

Week 5: What is Energy?

• pages 81-93 of chapter 2 ("Matter: The Stuff of the Universe")
• pages 111-119 of chapter 3 ("Energy: The Power of Cosmic Phenomena")
• pages 138-151 of chapter 3 ("Energy: The Power of Cosmic Phenomena")
• pages 164-170 of chapter 4 ("Frontiers: The Limits of Motion, Matter, and Energy")
• Complete all activities in Week 5 of the course

Week 6: Where Are We Now?

• pages 192-202 of chapter 4 ("Frontiers: The Limits of Motion, Matter, and Energy")
• Complete all activities in Week 6 of the course

Checklist

AMNH has provided a checklist for you to follow for a quick outline of all the course materials. This checklist does not replace the course materials, but does provide you a document to check off items as you complete them. You are expected to use the course readings and videos to aid in your discussion participation and completing your assignments and final project.

"Weekly Checklist"

Tips For Success

The keys for these seminars are attendance and participation. You will get out of these seminars what you put into them:

1. How AMNH assessment works

You are assessed based on your participation in discussion, assignments, and the final project. Refer to the rubric for the course assignments and final project for more information about what is expected. It is important to note that your discussion assessment is based on both the content of your posts and your level of participation. (Quality is more important than quantity, but 35 posts that expand on the discussion would be an appropriate level of participation.) Your assessment grades can be viewed in your gradebook as soon as they are posted, but it sometimes takes a week or two to get all the grades posted.

Your final project is due the week after the seminar ends. If you follow the weekly milestones for the project, it should be a rewarding exercise that will be useful in your teaching practice. Your final assessment is e-mailed to you as a PDF approximately two weeks after its submission due date. That is where you will find the instructors' notes on your final project. Your scores will be submitted directly by AMNH to WGU. If you need your score posted more
quickly, once you receive your final score from AMNH you may forward the final assessment report to scores@wgu.edu along with the Score Report Cover Sheet.

2. Get into the seminar early and often

AMNH online seminars are not self-paced, but are asynchronous by week-this is different from the WGU structure to which you are accustomed. There are no required log-in times, but each week has assignments and/or discussions in which you are required to participate. The seminars are not overwhelming if you don't fall behind. It's important to pace yourself through the weeks (especially if you are taking more than one course at a time). For example, a good weekly schedule would be:

- **Monday and Tuesday**-Read assigned essays and selections from the text.
- **Wednesday**-Post a response to your readings in the weekly discussion thread, and read over what others have written, making comments as you see fit.
- **Thursday**-Start working on your assignment for the week, if there is one. Be sure to follow the instructions and rubric, to which your goal is to meet or exceed expectations.
- **Friday-Sunday**-Go back to the discussion, read follow-up posts, and continue conversations that have developed over the week. Make sure you pay particular attention to questions the instructional team has posted to your comments. You will need to respond to these questions whether or not another student has already done so. Also, finish up your assignment. It is due at 10 AM ET Monday following the week it is assigned, so it is recommended that you submit Sunday evening.

Therefore, it is good to visit your AMNH seminar and participate at least twice each week. It is not necessary to respond to every thread, but you should keep up with the flow of discussion and meet the requirements of the seminar. If you have to miss some time, you can always read ahead in the seminar. If you let your instructor know, they can help you come up with a schedule to keep you on top of the material.

3. Participate in the icebreaker

The first week has an "icebreaker" discussion thread that asks you to introduce yourself to your classmates. Please participate in this thread as early as possible-it lets the instructors know your background so they can tailor the experience to you. Reading through this discussion lets you know who else will be in your seminar and helps to familiarize you with the seminar's discussion format.

4. E-mail your instructors and/or mentors any time with questions and concerns

The instructional team for AMNH seminars is aware that people are coming to the seminar with varying levels of science content knowledge and classroom experience. They are very willing to give you a guiding hand if you feel out of your depth on a particular topic, or if you are confused by an assignment. Your WGU mentor has a good grasp of how the seminars
work, and can give you advice on how best to tie your seminar into developing the competency required by WGU.

Your AMNH instructor will contact your WGU mentor with a progress report if you are struggling. Your WGU mentor can explore ways to fit this seminar into your life. WGU mentors can help—but they cannot help if they do not know there is a problem.

5. Great learning happens in the discussion forums

The readings, videos, and interactives used in AMNH seminars are content-rich, but a good deal of learning happens in the discussion forums. This is where you actually have a chance to interact with a PhD scientist who is active in the field, and where you can learn what your classmates think about that week’s topic. It’s a handy place to pick up extra links that will help you with the material, and to work out problems you may be having with the material. Discussion forums are essential, so don’t brush them off! Another important thing to note is that the discussions are 40% of your grade - so participation is essential to pass!

Be Prepared for the Final Project

The final project for this course is a lesson plan that you will create, incorporating the information that you learned throughout the course into the lesson plan. It is essential that you feel comfortable creating lesson plans prior to enrolling in this course. If you are unsure how to create a lesson plan, you may want to discuss with your program mentor enrolling in a course that covers lesson plan preparation prior to enrolling in this AMNH seminar.

IMPORTANT NOTE: AMNH will submit your assignments and final project to TurnItIn (TII) to verify originality. After completing this course, you may decide to reuse parts of your AMNH assignments in other WGU courses. Because these materials will have been previously submitted to TII, they will be flagged in subsequent TII originality reports as copied content. To make it easier for WGU staff to verify the originality of your work in future TII reports and to avoid authenticity concerns, you must include your full name, as it appears in your WGU account, within all of your AMNH assignments as well as any future WGU submissions that include your AMNH work. The upper left corner of your project and assignments or the line directly under the title work would be good places to put your full WGU name so it will be easy for WGU staff to find.

Textbooks

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