



SCIENCE, TECHNOLOGY, AND ENVIRONMENT ABE170A2

General Education Category: Natural Sciences

Shantz 338, Mondays: 9-11, 11-1, or 1-3

Description of Course

The environment, scientific method, technology, motion, energy, gases, heat, chemistry, and electricity and magnetism are covered within the context of natural history and technology development. Laboratories and field trips in the in-person sections include aquaponics, biofuels, solar pumping, and drip irrigation.

The first 10 weeks cover natural history: universe, elements, sun, protoplanetary disk, earth, algae and plant evolution, earth's environment, invertebrate and vertebrate evolution, mammal and reptile evolution, human evolution. The last five weeks cover technology development: agriculture, water, energy, food, pollution

The course includes labs, field trips, and optional field trips (extra credit).

Instructor and Contact Information

Peter Waller, 530 Shantz, 520-621-2896, pwaller@email.arizona.edu

Friday 9 am to noon /"Open Door Policy"

Course home page d2l.arizona.edu, Instructor home page:
<http://cals.arizona.edu/abe/people/peter-waller>

Course Format and Teaching Methods

The course has online lectures and homework. Class attendance is required. In-class activities include group activities, skills development, discussions, labs, and field trips. Optional field trips can substitute for attendance in 1 to 3 class periods. Homework is open book and due on Mondays at midnight. The final is closed book.

Course Objectives and Expected Learning Outcomes

Requirements

- Complete 13 out of 15 homework sets
- Complete 8 out of 10 discussion posts
- Actively participate in the group project and complete outline and paragraph, initial draft of report, final draft of report, video, and website page
- Actively participate in in-class activities
- Comprehensive final

Learning objectives

- Students accomplish the learning objectives specified in each chapter.
- Students describe basic scientific concepts required for tier one natural science courses.
- Students present a brief summary of natural history.
- Students present a brief summary of technology development.
- Students use peer reviewed sources to understand topics and to make arguments.
- Students present technical information and arguments in concise written documents.
- Students work together with other group members to make a group report.
- Students make a website.
- Students make a video.

- Students collect laboratory data and present data and equations in Excel graphs.
- Students distinguish between laws, theories, hypotheses, and unknowns.

All of the four General Education Program Outcomes are introduced, practiced, and assessed. (Think Critically, Communicate Effectively, Use Information Effectively, Understand and Value Differences)

Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable: <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences preapproved by the UA Dean of Students (or dean's designee) will be honored. See <http://policy.arizona.edu/employmenthuman-resources/attendance>.

Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings. Students who miss class due to illness or emergency are required to bring documentation from their health-care provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences.

Makeup Policy for Students Who Register Late

Students who register after the first class meeting may not make up missed assignments/quizzes. However, two assignments are dropped so late students will not be penalized as long as they complete all other assignments.

Course Communications

All course communications will be with your official UA email address. Emails are often generated through D2L email. Information is generally duplicated in D2L news page.

Required Texts or Readings

Course notes are electronically available in D2L Content in the daily modules. They are copyrighted but free to registered students. Lecture/videos, links to the weekly homework, outside readings and videos on the web are also included in the D2L Content modules. The modules clearly describe optional and required activities for each week.

Required or Special Materials

No special tools or supplies. An optional aquaponics activity requires investment in inexpensive aquaponics equipment.

Required Extracurricular Activities

The class will engage in the following required field trips and laboratories off campus during regularly scheduled class periods.

- Algae research facility, Controlled Environment Ag Center (2411 E Roger Road) Oct 3
- Arizona Museum, Southwest Native American Exhibit (1013 E University Blvd) Oct 31
- Solar pumping and drip irrigation lab (ABE shop) Nov 21

Map to 2411 E Roger Road and ABE shop on next page.



Students can take the following optional field trips and substitute them for in-class activities and discussions or count them as extra credit if they attend 13 regularly scheduled class sessions. Students will make a photo log of their trip and save the receipt in order to prove their participation. Students must complete all field trips by November 15. We will schedule one van trip to Skynights, one van trip to Biosphere 2, and one mirror lab tour (on campus), one Kitt peak tour, and one wetlands tour and one Botanical Gardens tour; however, students are also welcome to go on their own time. Sign up for optional field trips in the D2L quizzes by the September 5 if you would like to go with the group. Then, we will try to schedule a trip that all interested students can attend.

A maximum of 12% is possible for attendance (normally 8%) with any combination of regularly scheduled classes and field trips. Because attendance is 8% of the grade, students can earn up to 4% extra credit for the class. For example, if a student attends 13 regularly scheduled classes and earns 6.5 extra class credits, then they will earn 12% for attendance.

- Mirror lab (\$10, substitutes for 1 class period and 1 discussion post)
9/9 Friday 1 pm – 2:30. Sign up online. Meet at 12:50 at Mirror lab (under stadium)
- Biosphere 2 (\$10, substitutes for 2 class periods and 1 discussion post)
10/7 Friday 12 noon – 4 pm. Meet at Shantz East parking lot at noon or at biosphere 2 at 1.
- Wetlands tour (free, must go with instructors)
11/11 Friday 12 noon – 2 pm. Meet at Shantz East parking lot.
- Sky Nights on Mt Lemmon (\$65, substitutes for 3 class periods and 1 discussion posts)
9/30 Friday pm – 10 pm. Meet at Shantz East parking lot at 2 pm or on mt lemmon at 3:30
- Optional home aquaponics system (purchase supplies at store, substitutes for 3 class periods and 1 discussion.)
- Kitt Peak (\$7.50, visit Mayall telescope, substitutes for 3 class periods and 1 discussion post, must take picture of self inside Mayall telescope if you don't go with the class)
tentatively insiders tour Saturday 9/17 or 10/8 9 am – 3 pm border patrol checkpoint (international students) spectroscopes, dark energy survey Meet at Shantz east parking lot at 9 am or on Kitt Peak at 10:30 am. If you go on a regularly scheduled tour it is only worth 2 classes since the tours are a little over 1 hour.
- Tucson Botanical Gardens (\$13, must go with instructors, subs for 1 class period and 1 discussion post, must take pictures of self with 5 ancient plant species) Friday 10/28, meet at noon in Shantz parking lot or at Tucson Botanical Gardens at 12:15. Return by 2 pm.
- Other speeches or events that might be selected during the semester (0.5 class periods).

Assignments and Examinations: Schedule/Due Dates

Required papers and assignments: paragraph and outline, 5-page report, 5-page revision, 10 half-page discussion posts, 15 homework assignments, video, website, final exam.
No late work is accepted.

Writing Requirement

All Tier One and Tier Two General Education Courses are writing intensive (<http://gened.arizona.edu/content/writing-component>).

The group project requires each student to write at least five pages. The report is edited for grammar, first by other students, and then by the instructor or teaching assistant. Each student then rewrites the document based on edits. The groups work together to correlate documents into a final report.

The instructor posts a discussion topic during 10 out of 15 weeks of the semester. Students take a side and support their arguments with peer-reviewed literature. The first paragraph describes the position, and the second supports the argument. Discussions are half page or more high level arguments that are supported by peer-reviewed literature. Discussions are reviewed in class by other students. This format leads to writing improvement over the course of the ten required discussions.

Final Examination or Project

The final consists of two parts: multiple choice questions based on the written essays in the homework (30%) and 30 true-false questions (70%), drawn from a large pool of questions that are available in the form of jeopardy questions before the final. They will not be the same as the jeopardy questions because the jeopardy questions have What is ___ answers, but they will be true false questions based on the jeopardy questions. If you know the answer to a jeopardy question, then the true -false questions on the exam will be obvious. You will have two chances on the final. For example, you could come in the morning and take the exam, and if you do not like your score, you could come back in the afternoon and take it again. The final exam will be on Monday, December 12 in Shantz 338. You can come in anytime between 9-5.

<https://www.registrar.arizona.edu/courses/final-examination-regulations-and-information?audience=students&cat1=10&cat2=31>

Grading Scale and Policies

In general, the class has approximately 30% A grades, 30% B grades, 30% C grades, and 10% lower grades. In general, all students who remain in the class and turn in assignments earn at least a C grade. University policy regarding grades and grading systems is available at <http://catalog.arizona.edu/policy/grades-and-grading-system>

The assignments are weighted according to the following percentages.

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|------------------------------------|-----|----|
| Homework Assignment | 30% | |
| Paper and video | 27% | |
| Outline, paragraph, and references | | 2% |
| Final draft of paper to D2L | | 7% |
| Edited paper to Google docs | | 4% |
| Video | | 7% |
| Website | | 7% |
| Aquaponics report | 3% | |
| Discussion posts | 12% | |
| Class participation | 8% | |
| Final | 20% | |

No late work is accepted without an approved and documented medical excuse. Students are guaranteed the following minimum grades (the curve will not be higher).

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|-------|---|
| > 90% | A |
| > 80% | B |
| > 65% | C |
| > 50% | D |
| < 50% | E |

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete> and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively.

Dispute of Grade Policy: Students are welcome to dispute grades at any time during the semester, until the grades are turned in.

Honors Credit

This course has an honors contract. Students desiring honors credit will participate in a group of 3 students and design and operate a home aquaponics project. They will control nutrients, lettuce, and fish and write up a report that enables homeowners to duplicate their system. Honors contract information is available at <http://www.honors.arizona.edu/future-students/honors-credit-across-campus>.

Scheduled Topics/Activities

| Date posted | Subject | Activities | Assignments due |
|---------------------------------------|---------------------------------------|---|---|
| Aug 22 Homework 1 Discussion 1 | Introduction | <ul style="list-style-type: none"> Review syllabus Form groups Learn names Begin outline and paragraph Location: Shantz 338 Google docs intro Discuss discussions | <ul style="list-style-type: none"> Introduction discussion and quiz (not graded) |
| Aug 29 Homework 2 Discussion 2 | Chapter 1 Origin of Space and Time | <ul style="list-style-type: none"> HW 1 question/answer Work on outline and paragraph Aquaponics introduction Location: Shantz 338 | <ul style="list-style-type: none"> Homework 1 |
| Sept 5 Homework 3 | Chapter 2 The Elements | <ul style="list-style-type: none"> No class, holiday Location: anywhere you are | <ul style="list-style-type: none"> Homework 2 Discussion 1 |
| Sept 12 Homework 4 | Chapter 3 The Sun | <ul style="list-style-type: none"> HW 3 question/answer Oral review of disc. 1, 2 Group review and edit of outline and paragraph Aquaponics spreadsheet work Logarithmic axis review Location: Shantz 338 | <ul style="list-style-type: none"> Homework 3 Discussion 2 Outline and paragraph to Google docs |
| Sept 19 Homework 5 | Chapter 4 The Protoplanetary Disk | <ul style="list-style-type: none"> HW 4 question/answer Exponential graph review Guest presentation by astronomer Malanka Riabokin Location: Shantz 338 | <ul style="list-style-type: none"> Homework 4 |
| Sept 26 Homework 6 Discussion 3 | Chapter 5 The Planets | <ul style="list-style-type: none"> HW 5 question/answer Group consult research paper Aquaponics spreadsheet work Location: Shantz 338 | <ul style="list-style-type: none"> Homework 5 |

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| October 3 Homework 7 Discussion 4 | Chapter 6 Algae and Plant Evolution | <ul style="list-style-type: none"> Algae raceway, CEAC, and aquaponics Location 2411 E Roger Rd use google maps (down the dirt road). Meet at 9:30, 11:30, and 1:30 at Roger Rd. | <ul style="list-style-type: none"> Homework 6 Discussion 3 |
| October 10 Homework 8 Discussion 5 | Chapter 7 Earth's climate | <ul style="list-style-type: none"> HW 7 question/answer Oral review of discussion 3 Solar cooker demonstration Aquaponics spreadsheet work | <ul style="list-style-type: none"> Homework 7 Discussion 4 |
| October 17 Homework 9 | Chapter 8 Invertebrate and Vertebrate Evolution | <ul style="list-style-type: none"> HW 8 question/answer Group edit research papers Oral review of discussion 4 | <ul style="list-style-type: none"> Homework 8 Discussion 5 Research paper to D2L |
| October 24 HW 10 Discussion 6 | Chapter 9 Reptile and Mammal Evolution | <ul style="list-style-type: none"> HW 9 question/answer Oral review of discussion 5 Open new group google doc for final versions of paper Aquaponics spreadsheet work Video training (bring computer) | <ul style="list-style-type: none"> Homework 9 |
| October 31 HW 11 Discussion 7 | Chapter 10 Human Evolution | <ul style="list-style-type: none"> Arizona State Museum, Southwestern Anthropology Museum, 1013 E University Blvd. Meet at 10, 11, or 1 in the lobby of the museum | <ul style="list-style-type: none"> HW 10 Discussion 6 Final paper |
| November 7 HW 12 Discussion 8 | Chapter 11 Agriculture | <ul style="list-style-type: none"> HW 11 question/answer Oral review of discussion 6 Excel population graph Listen to speeches Aquaponics spreadsheet work Location: Shantz 338 | <ul style="list-style-type: none"> HW 11 Discussion 7 Upload video link to D2L or make speech |
| November 14 HW 13 Discussion 9 | Chapter 12 Water | <ul style="list-style-type: none"> HW 12 question/answer Biofuel laboratory Location: Shantz 338 | <ul style="list-style-type: none"> HW 12 Discussion 8 |
| November 21 HW 14 | Chapter 13 Energy | <ul style="list-style-type: none"> HW 13 question/answer Drip irrigation and solar pumping laboratory, also observe biofuel in dynamometer Location: ABE shop | <ul style="list-style-type: none"> HW 13 Discussion 9 |
| November 28 HW 15 Discussion 10 | Chapter 14 Food | <ul style="list-style-type: none"> HW 14 question/answer Aquaponics report completion Website help Review discussions 7-9 Location: Shantz 338 | <ul style="list-style-type: none"> HW 14 Aquaponics report Post web link to D2L |
| December 5 | Chapter 15 Pollution | <ul style="list-style-type: none"> HW 15 question/answer Jeopardy games Location: Shantz 338 | <ul style="list-style-type: none"> HW 15 Disc. 10 |

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| December 12 Monday | Final exam | You can take the final exam any time between 9 am and 5 pm. Location: Shantz 338 | |
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Bibliography

Supplemental materials are listed in weekly modules in D2L.

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

The course is conducted in a computer classroom. Students are welcome to use the classroom computers or to bring their laptops.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

Notification of Objectionable Materials

There are no objectionable materials in this class.

Accessibility and Accommodations

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact the Disability Resource Center (520-621-3268) to establish reasonable accommodations. For additional information on the Disability Resource Center and reasonable accommodations, please visit <http://drc.arizona.edu>.

If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See <http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

The University Libraries have some excellent tips for avoiding plagiarism, available at <http://www.library.arizona.edu/help/tutorials/plagiarism/index.html>.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional Resources for Students

UA Academic policies and procedures are available at <http://catalog.arizona.edu/policies>.

Student Assistance and Advocacy information is available at <http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

Confidentiality of Student Records

<http://www.registrar.arizona.edu/ferpa/default.htm>

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.