# Modeling Human Environment Systems

I recommend downloading the .pdf of the syllabus here, but content is also pasted below:

Syllabus_and_Schedule_2022.pdf (https://usu.instructure.com/courses/698336/files/83407250?verifier=1nalQFch2LZkl2wzVYPZObHKvYA5tav0tTmm5W4h&wrap=1)
(https://usu.instructure.com/courses/698336/files/83406968?verifier=ICXq9yl2BOM5Pw8uTrl9Hodux68mX4rpxYtBlQWX&wrap=1)

---

**Modeling Human-Environment Systems**

**INSTRUCTOR:** Dr. Stefani Crabtree. Assistant Professor, Dept. of Environment and Society (EnvS) at Utah State University. Email: stefani.crabtree@usu.edu

Dr. Crabtree’s Teaching Assistant: Evan Holt, evan.holt@usu.edu

**CANVAS:** All course-related information will be posted on our Canvas website. The "announcements function" will also be used to send out emails to everyone concerning various items of interest.

<table>
<thead>
<tr>
<th>Module #</th>
<th>Lectures</th>
<th>Activities and readings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Who is your prof?</td>
<td>Read Ch. 0</td>
</tr>
<tr>
<td>1</td>
<td>What is ABM?</td>
<td>Activity: El Farol Model</td>
</tr>
<tr>
<td></td>
<td>Why archaeology?</td>
<td>Read Ch. 1</td>
</tr>
<tr>
<td></td>
<td>Why is ABM valid?</td>
<td>Activity: End of chapter exercises</td>
</tr>
<tr>
<td>2</td>
<td>Course structure</td>
<td>Read: Lotka-Volterra articles</td>
</tr>
<tr>
<td></td>
<td>Equation-based models</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Predator-prey dynamics</td>
<td>Activity: Wolf-sheep predation Model</td>
</tr>
</tbody>
</table>
4 Simulation & data
Model-based thinking
Activity: End of chapter exercises
Read Ch. 2

5 Parameterization
Why Pueblos and ABMs
Activity: End of chapter exercises
Read Ch. 3

Data-fitting and exploration
Garbage-in Garbage-out
Read: Ch. 4
Skim/be aware of: ODD protocol

6 Parsimony
Skillsets and Stack Exchange
Activity: End of chapter exercises
Read: Ch. 5

7 “Can you model my Valley?”
Building a model
Activity: End of chapter exercises
Read: Ch. 6

8 How to pare things down
How to build some things up
Activity: End of chapter exercises
Read: Segregation Schelling paper

9 What makes a good model?
Space, interaction & heterogeneity
Activity: Schelling Model
Read: Ch. 7

10 How to incorporate GIS
What is and is not space?
Activity: End of chapter exercises
Read: Ch. 8

11 Theory-driven models
What is a theory and how to find one?
Activity: End of chapter exercises
Developing a model, end-to-end, from theoretical underpinnings
Read: Ch. 9

12 Data and Interpretation of results
Garbage-in Garbage-out again
Activity: End of chapter exercises
13 Model-based thinking recap
Activity: pick a model and rewrite it from ODD (compulsory for ‘for-credit’ students; optional for others). Due by end of term

Converting the nay-sayers

14 How to deal with criticism
What to do when you’re wrong?

If you are taking the course for credit (USU Students):

Each “Activity” with a lab writeup is worth 5 points for 70 points total. Your final project (coding a model from an ODD protocol of your choice) will be worth 130 points for a nice and round 200 points total.

GRADING: The total possible points for this course will be about 400. Final letter grades will be roughly based on the traditional point scale based on the percentage of total possible points achieved. For example, the typical scale would be: A (93–100%); A- (90–92%); B+ (87–89%); B (83–86%); B- (80–82%); C+ (77–79%); C (73–76%); C- (70–72%); D (60 – 69%); F (Below 60%).

Emails
I will respond to emails during regular business hours, within 48 hours of receiving it. Do not expect a response to your email directly before class, late at night, or over the weekend.

Academic Integrity
All students are responsible for reading and understanding the Utah State University Standards of Conduct for Students. When submitting an assignment to satisfy course requirements, you are indicating that it is your own, original, work. Failure to acknowledge your use of other works is plagiarism. Academic dishonesty will not be tolerated. Academic dishonesty of any form will result immediate failure of the course.
https://studentconduct.usu.edu/studentcode/article6

Plagiarism: Anyone found guilty of plagiarism will receive a zero for the given assignment and will be reported to the office of the Dean of Students without exception. Please refer to Utah State University’s official statement on academic integrity standards and procedures. If you don’t know what plagiarism includes, then ask. Ignorance is not a valid excuse.

All students deserve to be in a safe atmosphere free of discrimination, sexual misconduct, or other ill-advised behaviors. Problems should first be reported to the instructor, and he or she may recommend other contacts or resources at USU as needed. The instructor will not hesitate to enforce a strict code of ethical conduct in class.
Disability Resource Center (DRC): USU is required by law to help disabled students participate fully in all programs, activities, and services. If you have a disability, documented by the DRC, that requires note-takers, interpreters for the deaf, extended testing time, etc., let the instructor know as soon as possible. The DRC may also help provide course material in alternative formats like large print, Braille, and diskette. See the DRC web site http://www.usu.edu/drc/

Counseling: USU offers an excellent counseling center (TSC 306) on campus for individuals, groups, and couples. Services include consultations, crisis appointments, and therapy animals are on site. All services are confidential and most are free of charge. See the USU web site http://counseling.usu.edu/

Student Rights and Responsibilities: You can learn more about your student rights by reading the Code of Policies and Procedures for Students at Utah State University. This can be found at: http://www.usu.edu/studentservices/studentcode/

Emergency Procedures: In the case of an emergency involving a fire, earthquake, chemical spill, threatening weather, active shooter, etc., all students and faculty will be notified via the USU CODE BLUE system via electronic messaging to phones, laptops, etc. Additionally, fire may be announced in any given building by a traditional alarm system. For situations requiring evacuation, an orderly and appropriately timed exit will be organized by your instructor and the teaching assistants. In contrast to evacuation, an active shooter situation on campus typically requires that everyone remain in the classroom. The procedure for large, auditorium-style rooms includes: (1) Turning out all lights; (2) having students remain seated or seeking cover under desks; and (3) closing and securing the main doors (as possible) from the inside. Students can then monitor the situation on their phones.

Missing an Exam: Sometimes things happen in life that preclude your ability to come to sit an exam. Please email me before the exam to let me know what happened and I will do my best to accommodate you. This is not a free pass for skipping an exam because you didn’t feel like coming; be courteous for your classmates who do experience deaths in the family or severe health problems. This is the honor system, but know I won’t penalize you for dealing with a major life event.

Final Project Instructions

130 points

Due April 29th

For your final project you will need to build an agent-based model on your own. You have two options for this project.

1. Build a published model based on their description in the publication and their ODD protocol
2. Write a significant expansion of a model, either that we have explored in class or that you have explored on your own.

For Option 1:

There are several models that have been published in the scientific literature and that have a good description in the manuscript as well as any accompanying ODD protocol. Following the published model description, build your own version of it in NetLogo. You will be turning in your own description of the model as well as the code.

Make sure to comment your code (;) to tell me what each bit of your code does, and add all necessary information in the "Info" tab of the model.

For Option 2:

Expanding upon models is valid and a useful way to assess how things can change over time. If you choose this option you will be taking a published model, either that we have explored in class or one that you have found, and building another module on top of it.

An example of this (which is acceptable to choose as your project) would be to take the Wolf-Sheep Predation model and add another organism that is an omnivore—it eats grass and sheep (and maybe wolves too). What should its reproductive dynamics be? What is its feeding rate? How does having another organism that feeds at multiple trophic levels impact the way the model performs? With the addition of another organism can stability be achieved in the system?

You can choose any model, either explored by us in class or that you find, and add a substantial element.

Make sure to comment your code (;) to tell me what each bit of your code does, and add all necessary information in the "Info" tab of the model.

What you will be turning in

1. A fully commented version of your code, with a filled out "Info" tab
2. A 5-page lab report of your model, describing what you did, with any explanatory screen-shots or graphs to tell me how your model functions and what inferences it gives you about the system you are studying.
All USU students attending classes in Logan, at our Regional Campuses, or online can access all databases, e-journals, and e-books regardless of location. Additionally, the library will mail printed books to students, at no charge to them. Students can also borrow books from any Utah academic library. Take advantage of all library services and learn more at libguides.usu.edu/rc. (http://libguides.usu.edu/rc)

Classroom Civility

Utah State University supports the principle of freedom of expression for both faculty and students. The University respects the rights of faculty to teach and students to learn. Maintenance of these rights requires classroom conditions that do not impede the learning process. Disruptive classroom behavior will not be tolerated. An individual engaging in such behavior may be subject to disciplinary action. Read Student Code Article V Section V-3 (https://studentconduct.usu.edu/studentcode/article5) for more information.

University Policies & Procedures

COVID-19 Classroom Accommodations

If you face COVID-19 related challenges and feel you need accommodations, you must request those accommodations by filling out the COVID-19 Questionnaire (https://www.usu.edu/covid-19/questionnaire/index.php). Upon doing so, the University COVID CARE Team (https://www.usu.edu/covid-19/if-you-are-sick/care-team.php) will contact you to determine your needs and how to support you. The CARE Team will also contact your instructors and provide important direction on how best to accommodate your needs. For additional reference, please see USU's Attendance and Excused Absence (https://catalog.usu.edu/content.php?catoid=12&navoid=3160) policy and the COVID-19 Classroom Accommodations (https://www.usu.edu/covid-19/operations/accomodations) page.

Reducing COVID-19 Risk

You can help keep classes, events, and activities happening in person this semester by following these steps:

1. **Get vaccinated if you're able.** Vaccines are the best available tool to help stop the spread of COVID-19. They are free, safe, and easy to access.
2. **If you are vaccinated, let USU know.** Please upload your proof of full vaccination (http://aggiehealth.usu.edu/) to AggieHealth. If you are exposed to COVID-19, USU's case containment will not require you to quarantine if they know you are vaccinated and you do not have symptoms.
3. **Stay home if you're sick** and get tested for COVID-19 if you have symptoms or have been exposed. It's important to not bring any illness to campus.
4. **Wear a mask indoors.** Public health experts recommend that even vaccinated people wear masks indoors in high COVID-19 transmission areas, which includes most of Utah.

If USU’s COVID Case Containment team identifies an uncontained situation in the classroom, you will be notified of any temporary changes to your course delivery method through a Canvas announcement. Please make sure you are receiving immediate notifications of new Canvas announcements. The situation will be handled according to protocols on the COVID Classroom Exposure (https://www.usu.edu/covid-19/students/classroom-exposure) page.

Class Seating Charts (For In-Person Classes)

In classes with more than 10 students, a seating chart will be used to track where you are sitting. After the first week of classes, your instructor will tell you how to enter your seat number in Canvas. **You must sit in the same seat for the rest of the semester.** This is extremely important for tracking cases of COVID-19 and helping classes remain in person.

Academic Freedom and Professional Responsibilities
Academic freedom is the right to teach, study, discuss, investigate, discover, create, and publish freely. Academic freedom protects the rights of faculty members in teaching and of students in learning. Freedom in research is fundamental to the advancement of truth. Faculty members are entitled to full freedom in teaching, research, and creative activities, subject to the limitations imposed by professional responsibility. Faculty Code Policy #403 (http://www.usu.edu/hr/files/uploads/Policies/403.pdf) further defines academic freedom and professional responsibilities.

**Academic Integrity – "The Honor System"**

Each student has the right and duty to pursue his or her academic experience free of dishonesty. To enhance the learning environment at Utah State University and to develop student academic integrity, each student agrees to the following Honor Pledge:

"I pledge, on my honor, to conduct myself with the foremost level of academic integrity."

A student who lives by the Honor Pledge is a student who does more than not cheat, falsify, or plagiarize. A student who lives by the Honor Pledge:

- Espouses academic integrity as an underlying and essential principle of the Utah State University community;
- Understands that each act of academic dishonesty devalues every degree that is awarded by this institution; and
- Is a welcomed and valued member of Utah State University.

**Academic Dishonesty**

The instructor of this course will take appropriate actions in response to Academic Dishonesty, as defined the University's Student Code. Acts of academic dishonesty include but are not limited to:

- **Cheating**: using, attempting to use, or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity. Unauthorized assistance includes:
  - Working in a group when the instructor has designated that the quiz, test, examination, or any other academic exercise or activity be done “individually;”
  - Depending on the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments;
  - Substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work;
  - Acquiring tests or other academic material belonging to a faculty member, staff member, or another student without express permission;
  - Continuing to write after time has been called on a quiz, test, examination, or any other academic exercise or activity;
  - Submitting substantially the same work for credit in more than one class, except with prior approval of the instructor; or engaging in any form of research fraud.

- **Falsification**: altering or fabricating any information or citation in an academic exercise or activity.

- **Plagiarism**: representing, by paraphrase or direct quotation, the published or unpublished work of another person as one’s own in any academic exercise or activity without full and clear acknowledgment. It also includes using materials prepared by another person or by an agency engaged in the sale of term papers or other academic materials.

For additional information go to: ARTICLE VI. University Regulations Regarding Academic Integrity (https://studentconduct.usu.edu/studentcode/article6)

**Discrimination and Sexual Misconduct**

**General Overview**
USU strives to provide an environment for students and employees that is free from discrimination (https://www.usu.edu/equity/non-discrimination.php) and sexual misconduct (https://www.usu.edu/equity/sexual-misconduct/Sexual-Misconduct-Terms.php). If you experience sexual misconduct or discrimination at any point during the semester inside or outside of class, you are encouraged to contact the USU Title IX Coordinator (https://www.usu.edu/equity/sexual-misconduct/Title-IX-Coordinator.php) via Old Main room 161 in Logan, 435-797-1266 (tel:1-435-797-1266), titleix@usu.edu (mailto:titleix@usu.edu), or at equity.usu.edu/report (https://www.usu.edu/equity/report.php). You can learn more about the USU resources available for individuals who have experienced sexual misconduct at sexualrespect.usu.edu (https://www.usu.edu/sexual-respect). Resources for individuals who have experienced discrimination are listed at equity.usu.edu/resources (https://www.usu.edu/equity/resources).

Required Reporting of Sexual Misconduct

The instructor is designated by USU as a "reporting employee (https://www.usu.edu/equity/sexual-misconduct/employees.php)." This means that if you share information about sexual misconduct (https://www.usu.edu/equity/sexual-misconduct/Sexual-Misconduct-Terms.php) (sexual harassment, sexual assault, relationship violence, or sex-based stalking) with the instructor, they will report that information to the USU Title IX Coordinator (https://www.usu.edu/equity/sexual-misconduct/Title-IX-Coordinator.php). The instructor is also required to tell you about designated confidential resources (https://www.usu.edu/sexual-respect/resources.php), supportive measures (https://www.usu.edu/equity/Supportive-Measures.php), and how you can file a report (https://www.usu.edu/equity/report.php) with the USU Title IX Coordinator.

Withdrawal Policy and "I" Grade Policy

Students are required to complete all courses for which they are registered by the end of the semester. In some cases, a student may be unable to complete all of the coursework because of extenuating circumstances, but not due to poor performance or to retain financial aid. The term ‘extenuating’ circumstances includes: (1) incapacitating illness which prevents a student from attending classes for a minimum period of two weeks, (2) a death in the immediate family, (3) financial responsibilities requiring a student to alter a work schedule to secure employment, (4) change in work schedule as required by an employer, or (5) other emergencies deemed appropriate by the instructor.

Students with Disabilities

USU welcomes students with disabilities. If you have, or suspect you may have, a physical, mental health, or learning disability that may require accommodations in this course, please contact the Disability Resource Center (DRC) (http://www.usu.edu/drc/) as early in the semester as possible (University Inn # 101, (435) 797-2444, drc@usu.edu (mailto:drc@usu.edu)). All disability related accommodations must be approved by the DRC. Once approved, the DRC will coordinate with faculty to provide accommodations.

Students who are at a higher risk for complications from COVID-19 or who contract COVID-19 may also be eligible for accommodations.

Respect for Diversity

Regardless of intent, careless or ill-informed remarks can be offensive and hurtful to others and detract from the learning climate. If you feel uncomfortable in a classroom due to offensive language or actions by an instructor or student(s) regarding ethnicity, gender, or sexual orientation, contact:

- Division of Student Affairs: https://studentaffairs.usu.edu (https://studentaffairs.usu.edu/), (435) 797-1712, studentservices@usu.edu (mailto:studentservices@usu.edu), TSC 220
- Student Legal Services: https://ususa.usu.edu/student-association/student-advocacy/legal-services (https://ususa.usu.edu/student-association/student-advocacy/legal-services), (435) 797-2912, TSC 326,
• Access and Diversity: [http://accesscenter.usu.edu](http://accesscenter.usu.edu), (435) 797-1728, [access@usu.edu](mailto:access@usu.edu); TSC 315
• Multicultural Programs: [http://accesscenter.usu.edu/multiculture](http://accesscenter.usu.edu/multiculture), (435) 797-1728, TSC 315
• LGBTQA Programs: [http://accesscenter.usu.edu/lgbtqa](http://accesscenter.usu.edu/lgbtqa), (435) 797-1728, TSC 3145
• Provost’s Office Diversity Resources: [https://www.usu.edu/provost/diversity](https://www.usu.edu/provost/diversity), (435) 797-8176

You can learn about your student rights by visiting:
The Code of Policies and Procedures for Students at Utah State University: [https://studentconduct.usu.edu/studentcode](https://studentconduct.usu.edu/studentcode)

**Grievance Process**

Students who feel they have been unfairly treated may file a grievance through the channels and procedures described in the Student Code: Article VII ([https://studentconduct.usu.edu/studentcode/article7](https://studentconduct.usu.edu/studentcode/article7)).

**Full details for USU Academic Policies and Procedures can be found at:**

- Student Conduct ([http://www.usu.edu/studentconduct](http://www.usu.edu/studentconduct))
- Student Code ([https://studentconduct.usu.edu/studentcode/](https://studentconduct.usu.edu/studentcode/))
- Academic Integrity ([https://studentconduct.usu.edu/studentcode/article6](https://studentconduct.usu.edu/studentcode/article6))

**Emergency Procedures**

In the case of a drill or real emergency, classes will be notified to evacuate the building by the sound of the fire/emergency alarm system or by a building representative. In the event of a disaster that may interfere with either notification, evacuate as the situation dictates (i.e., in an earthquake when shaking ceases or immediately when a fire is discovered). Turn off computers and take any personal items with you. Elevators should not be used; instead, use the closest stairs.

**Mental Health**

Mental health is critically important for the success of USU students. As a student, you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. Utah State University provides free services for students to assist them with addressing these and other concerns. You can learn more about the broad range of confidential mental health services available on campus at Counseling and Psychological Services (CAPS) ([https://counseling.usu.edu](https://counseling.usu.edu)).

Students are also encouraged to download the “SafeUT App” ([https://healthcare.utah.edu/uni/programs/safe-ut-smartphone-app](https://healthcare.utah.edu/uni/programs/safe-ut-smartphone-app)) to their smartphones. The SafeUT application is a 24/7 statewide crisis text and tip service that provides real-time crisis intervention to students through texting and a confidential tip program that can help anyone with emotional crises, bullying, relationship problems, mental health, or suicide related issues.