Term Information

Effective Term	Spring 2023
Previous Value	*Autumn 2015*

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

We request to change the course number from 5226 to 6226.

What is the rationale for the proposed change(s)?

We would like to use this as an advanced course in the curriculum of a new professional masters program, which will be proposed soon in Autumn 2021. This course in its current form contains advanced topics that is suitable to professional masters students.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

In the attached explanation document entitled Geography Curriculum Mapping: Summary of Changes, we explain that such a change will not affect the coverage of the proficiencies of our undergraduate program.

Is approval of the requrest contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area	Geography
Fiscal Unit/Academic Org	Geography - D0733
College/Academic Group	Arts and Sciences
Level/Career	Graduate, Undergraduate
Course Number/Catalog	6226
Previous Value	*5226*
Course Title	Spatial Simulation and Modeling in GIS
Transcript Abbreviation	GIS Sim&Modeling
Course Description	Fundamental modeling and simulation techniques in GIS, including cellular automata, diffusion models, and agent-based models, and their applications in social, environmental, and natural resources research.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week, 12 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	Yes
Is any section of the course offered	100% at a distance
	Greater or equal to 50% at a distance
Previous Value	*No*
Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No

Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites	
Exclusions	Not open to students with credit for 5221 or 5226
Previous Value	Not open to students with credit for 5221 or 685.
Electronically Enforced	No

Cross-Listings

Cross-Listings	

Subject/CIP Code

Subject/CIP Code	27.0303
Subsidy Level	Doctoral Course
Intended Rank	Masters, Doctoral
Previous Value	*Junior, Senior, Masters, Doctoral*

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes	• Understand the nature of complexity and complexity in nature
	• Understand the nature of computational techniques
	• Understand computational science as a tool for scientific investigation
	• Understand and use spatial simulation techniques
Content Topic List	• Fundamental modeling and simulation techniques in GIS
	• Cellular automata
	• Diffusion models
	• Agent-based models
	• Applications in social, environmental, and natural resources research
Sought Concurrence	No

Attachments

- GEOG6226-inperson.docx: Syllabus (in-person)

  (Syllabus. Owner: Xiao,Ningchuan)

- GEOG6226-online-spatial-simulation-modeling.docx: Syllabus (online)

  (Syllabus. Owner: Xiao,Ningchuan)

- GEOG6226-online-asctech-review.docx: ASCTech review (online)

  (Other Supporting Documentation. Owner: Xiao,Ningchuan)

- Curriculum_map_GEOG_GIS_ONLY.pdf: Curriculum maps

  (Other Supporting Documentation. Owner: Xiao,Ningchuan)

- Curriculum_map_summary_GIS-all.docx: Summary of changes in curriculum maps

  (Other Supporting Documentation. Owner: Xiao,Ningchuan)

- GEOG5226-inperson.docx: Syllabus (in-person, current)

  (Syllabus. Owner: Xiao,Ningchuan)

- GEOG6226-online-spatial-simulation-modeling-v2.docx: Syllabus (online, updated)

  (Syllabus. Owner: Xiao,Ningchuan)

- GEOG6226-hybrid-spatial-simulation-modeling-v2.docx: Syllabus (hybrid, updated)

  (Syllabus. Owner: Xiao,Ningchuan)

- GEOG6226-in-person-spatial-simulation-modeling-v2.docx: Syllabus (in-person, updated)

  (Syllabus. Owner: Xiao,Ningchuan)

Comments

- Responses to the six contingencies:

  - The ASC template is now adopted for all three syllabi (in-person, online, and hybrid).

  - The schedule now accounts for all 14 weeks.

  - Pages numbers are now included in the course schedule.

  - The most up-to-date version of the University's disability services statement is now used in the syllabi.

  - The DL course does not have an in-person component, and students can complete the assignments using their own computer. This is now clarified in the "Descriptions of major course assignments" section.

  - The software tools required for this course have received ASC Tech's review of Accessibility and Usability (please see the attached AST Tech reviews). NetLogo is a well-tested open-source package that has been widely used, with a huge world wide user community.

  Updated syllabi are labelled as -v2 in their file names. *(by Xiao,Ningchuan on 01/25/2022 12:46 AM)*

- Please see Panel feedback e-mail sent 12/03/21. *(by Cody,Emily Kathryn on 12/03/2021 02:29 PM)*

- The course number has not been changed in curriculum.osu.edu *(by Vankeerbergen,Bernadette Chantal on 11/12/2021 09:38 AM)*

Last Updated: Vankeerbergen,Bernadette
Chantal
01/25/2022

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Xiao,Ningchuan	11/09/2021 12:57 AM	Submitted for Approval
Approved	Xiao,Ningchuan	11/09/2021 12:58 AM	Unit Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	11/12/2021 09:41 AM	College Approval
Submitted	Xiao,Ningchuan	11/12/2021 09:53 AM	Submitted for Approval
Approved	Xiao,Ningchuan	11/12/2021 09:56 AM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	11/12/2021 10:22 AM	College Approval
Revision Requested	Cody,Emily Kathryn	12/03/2021 02:29 PM	ASCCAO Approval
Submitted	Xiao,Ningchuan	01/25/2022 12:47 AM	Submitted for Approval
Approved	Xiao,Ningchuan	01/25/2022 12:47 AM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	01/25/2022 09:25 AM	College Approval
Pending Approval	Cody,Emily Kathryn Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Hilty,Michael Vankeerbergen,Bernadette Chantal Steele,Rachel Lea	01/25/2022 09:25 AM	ASCCAO Approval

THE OHIO STATE UNIVERSITY

SYLLABUS
GEOG 6226

Spatial Simulation and Modeling in GIS
Autumn 2023 (full term)
3 credit hours
Online

COURSE OVERVIEW

Instructor

Instructor: Dr. Yang Song

Email address: (song.630@osu.edu)

Phone number: 614-292-2514

Office hours: TBD

Prerequisites

GEOG 5210 or consent of instructor

Course description

This course is about the use of computational techniques to simulate the evolution of complex spatial systems such as ecosystems, transportation, weather/climate, cities, economies, societies and landscapes. These and other complex systems have a multitude of relatively simple parts interacting over space and time to create surprising, emergent behaviors. Powerful computational techniques, often linked with GIS software, allow the simulation of realistically large systems at a fine-level of granularity, providing new insights that were unavailable through traditional modeling techniques.

This class meets twice a week for two 80-minute sessions.

We will explore three major types of "building-blocks" at the core of many dynamic spatial models: i) spatial aggregation and segregation processes, ii) random walks and mobile entities, and iii) percolation and growth processes. We will also discuss issues such as the role of spatial simulation in geographic information science, representation of space and time, how to build more complete models of human,

physical and linked human-physical dynamic spatial processes, and how to evaluate model performance and uncertainty.

Course learning outcomes

By the end of this course, students should successfully be able to:

- Understand the nature of complexity and complexity in nature
- Understand the nature of computational techniques
- Understand computational science as a tool for scientific investigation
- Understand and use spatial simulation techniques

General education course information

This is not a GE course.

HOW THIS ONLINE COURSE WORKS

Mode of delivery: This course is 100% online. There are no required sessions when you must be logged in to Carmen at a scheduled time.

Pace of online activities: This course is divided into **weekly modules** that are released one week ahead of time. Students are expected to keep pace with weekly deadlines but may schedule their efforts freely within that time frame.

Credit hours and work expectations: This is a **3-credit-hour course**. According to Ohio State policy (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

Attendance and participation requirements: Because this is an online course, your attendance is based on your online activity and participation. The following is a summary of students' expected participation:

- **Participating in online activities for attendance**: AT LEAST ONCE PER WEEK
  You are expected to log in to the course in Carmen every week. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible.*
- **Office hours and live sessions**: OPTIONAL
  All live, scheduled events for the course, including my office hours, are optional.
- **Participating in discussion forums**: ONE OR MORE TIMES PER WEEK
  Each week, we will post at least one question that will require students to respond on a Carmen discussion board. Each student must respond at least once to the question in a

meaning way by, for example, providing materials to support the statements or arguments raised in the posted question, or discussing real-world applications that may support or counter the statements in the question. We will also encourage students to raise their own questions and respond to posts from others.

COURSE MATERIALS AND TECHNOLOGIES

Textbooks

Required

- O'Sullivan, D. and Perry, G. (2013) Spatial Simulation: Exploring Pattern and Process, Wiley. Available at university bookstore; also available in e-book format from Amazon.

- Additional readings and webpages will be posted at the Canvas course website. These resources will provide additional background material as well as deeper dives into the science behind the models discussed in class.

Other fees or requirements

- N/A

Course technology

Technology support

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** ocio.osu.edu/help
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu
- **TDD:** 614-688-8743

Technology skills needed for this course

- Basic computer and web-browsing skills
- Navigating Carmen (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)

- Recording a slide presentation with audio narration (go.osu.edu/video-assignment-guide)
- Recording, editing, and uploading video (go.osu.edu/video-assignment-guide)

Required equipment

- Computer: current Mac (MacOs) or PC (Windows 10) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed and tested
- Microphone: built-in laptop or tablet mic or external microphone
- Other: a mobile device (smartphone or tablet) to use for BuckeyePass authentication

Required software

Please keep in mind that you are NOT required to purchase any software for this class. The following list should help you access the software that is either open-source (NetLogo and its models) and free-of-cost to you as a student in this class.

- NetLogo
  - It will be available on the computers in our lab. However, since it is free and open source, you can download and install NetLogo on your personal machines: https://ccl.northwestern.edu/netlogo/ *However, note that you are on your own with installations on personal machines; we cannot provide technical support*.
  - The basic NetLogo install is simple, but some of the programs we will look at this semester will use the *gradient* extension. Installing the gradient extension is easy: go to this link, download and unzip the folder called *gradient* containing a single file called *gradient.jar*. Copy the entire folder to the same folder as your NetLogo models, or to the NetLogo *extensions* folder.   (Some NetLogo models also require an R extension for data analysis and reporting, but we will not be using these models.) For more details on these extensions, see the textbook authors' website: http://patternandprocess.org/. You can also follow NetLogo on Twitter: https://twitter.com/NetLogo.
  - System requirements of Netlogo can be found here. There are no official privacy policies from developers of QGIS.
- NetLogo models
  - Since it is open source, NetLogo comes with a wealth of freely available models (programs) across a wide range of applications. Models sources include:
    - Models Library - available in the NetLogo software itself; look under "Files" → "Models Library"
    - User community: https://ccl.northwestern.edu/netlogo/models/community/
- Models discussed in the textbook
  - The O'Sullivan and Perry text references and discusses a large number of NetLogo models. You should experiment with these models as part of your study **prior to class**. We will also work with some of these models in class.

- o Windows versions of the NetLogo models are available at the Canvas site: unzip the archive and copy the entire directory (including the gradient subdirectory) to your laptop or to a portable storage device for use during class.
- o Other sources for the NetLogo models, including Mac versions, include:
  - The authors' website, **Pattern and Process**: http://patternandprocess.org/.
  - O'Sullivan also maintains the most up-to-date versions of these models at a github repository: https://github.com/DOSull/model-zoo. (Note that the github repository may be incomplete: some models from the textbook may be missing.)
- Proctorio: A software to monitor online exams. More details can be found here.
- Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Full instructions for downloading and installation can be found at go.osu.edu/office365help.

Carmen access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions (go.osu.edu/add-device).
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application (go.osu.edu/install-duo) to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357(HELP) and IT support staff will work out a solution with you.

GRADING AND FACULTY RESPONSE

How your grade is calculated

ASSIGNMENT CATEGORY	POINTS
Lab assignments	50
Exams	50

Total	100

See course schedule below for due dates.

Descriptions of major course assignments

Lab assignments

There will be a series of NetLogo-based lab assignments throughout the semester. All lab assignments will be submitted via the course website and count toward your final grade of the course. Most lab assignments are due one week after each lab session (at 6:00pm of the due day). Lab 4 will be given two weeks to finish. All materials required for the lab assignments (NetLogo software, lecture notes, and other models) are available online or on Carmen. The lab assignments can be completed using students' own computers.

Students must finish their lab assignments individually. The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of lab assignments is encouraged, remember that comparing answers on an assignment is not permitted. If you're unsure about a particular situation, please ask ahead of time.

Exams

There will be 4 short examinations (20 -25 questions) during the semester. Exam questions will be drawn from the lectures, the textbook, and labs. Exams will be online using Carmen during the scheduled time, unless you have informed your instructor before the exam with proper reasons and documents, and have received permission from the instructor prior to the exam. You are expected to finish all exams on time. At the end of the scheduled class time, you are to stop working and turn in your exam. You may not continue working on your exam after the scheduled class time.

Students must complete these exams yourself, without any external help or communication. Weekly quizzes are included as self-checks without points attached but are still expected to be completed on your own.

Late assignments

Lab assignments will be penalized 10% for each day late. Please refer to Carmen for due dates. Extensions will not be granted due to lost work. Be sure you back up and keep all your work.

Grading scale

A	93-100%	B-	80-82%	D+	67-69%
A-	90-92%	C+	77-79%	D	60-66%
B+	97-89%	C	73-76%	E	0-59%
B	83-86%	C-	70-72%

Your final grade as seen on the course website will be rounded to the nearest whole number (e.g. an 89.49 is a B+ while an 89.50 is an A) before being submitted to the University Registrar at the end of the semester.

Instructor feedback and response time

You are responsible for all course related emails, so be sure to check your inbox on a daily basis. When emailing your instructor or TA, please always begin the subject of the email with the course number (GEOG6226) and your name (first name followed by last name). This is important as your instructor and TA teach multiple classes and need to know to which class you are referring. A proper email subject should be like this: GEOG6226_John Smith_Schedule a make-up exam.

I am providing the following list to give you an idea of my intended availability throughout the course. Remember that you can call **614-688-4357(HELP)** at any time if you have a technical problem.

- **Grading and feedback:** For large weekly assignments, you can generally expect feedback within **7 days**.

- **Email:** I will reply to emails within **24 hours on days when class is in session at the university**.

- **Discussion board:** I will check and reply to messages in the discussion boards every **24 hours on school days**.

OTHER COURSE POLICIES

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style**: While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics.
- **Tone and civility**: Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- **Citing your sources**: When we have academic discussions, please cite your sources to back up what you say. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.
- **Backing up your work**: Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Academic integrity policy

See **Descriptions of major course assignments**, above, for my specific guidelines about collaboration and academic integrity in the context of this online class.

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct **http://studentlife.osu.edu/csc/**.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct web page (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)

Student Services and Advising

University Student Services can be accessed through BuckeyeLink. More information is available here: https://contactbuckeyelink.osu.edu/

FOR UNDERGRAD COURSES: Advising resources for students are available here: http://advising.osu.edu

FOR GRADUATE COURSES: Please contact your graduate program coordinator for advising assistance.

Copyright for instructional materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on Title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at http://titleix.osu.edu or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu

Commitment to a diverse and inclusive learning environment

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Land Acknowledgement

We would like to acknowledge the land that The Ohio State University occupies is the ancestral and contemporary territory of the Shawnee, Potawatomi, Delaware, Miami, Peoria, Seneca, Wyandotte, Ojibwe and Cherokee peoples. Specifically, the university resides on land ceded in the 1795 Treaty of Greeneville and the forced removal of tribes through the Indian Removal Act of 1830. I/We want to honor the resiliency of these tribal nations and recognize the historical contexts that has and continues to affect the Indigenous peoples of this land.

More information on OSU's land acknowledgement can be found here:

https://mcc.osu.edu/about-us/land-acknowledgement

Your mental health

As a student you may experience a range of issues that can cause barriers to learn, 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 a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand. You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 1-

800-273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

ACCESSIBILITY ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Requesting accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** slds@osu.edu; 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This online course requires use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- Canvas accessibility (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- CarmenZoom accessibility (go.osu.edu/zoom-accessibility)
- Collaborative course tools

COURSE SCHEDULE

Refer to the Carmen course for up-to-date assignment due dates.

Week	Dates	Topics, Readings, Assignments, Deadlines
1	M 8/23	Course overview Lab 1 – Experimenting with NetLogo

Week	Dates	Topics, Readings, Assignments, Deadlines
2	M 8/28	Spatial Simulation Models - Part 1 (Ch 1.1, 1.2; pp. 1-14)
	W 8/30	Spatial Simulation Models – Part 2 (Ch 1.3, 1.4; pp. 14-28)
3	M 9/4	Labor Day (No class)
	W 9/6	Lab 2 – NetLogo world and agents
4	M 9/11	Pattern, Process and Scale – Part 1 (Ch 2.1, 2.2; pp. 30-45)
	W 9/13	Pattern, Process and Scale – Part 2 (Ch 2.2; pp. 46-56)
5	M 9/18	Exam 1
	W 9/20	Lab 3 - Programming with NetLogo
6	M 9/25	Aggregation and Segregation – Part 1 (Ch 3.1, 3.2; pp. 58-63)
	W9/27	Aggregation and Segregation – Part 2 (Ch 3.3; pp.64-69)
7	M 10/2	Aggregation and Segregation – Part 3 (Ch 3.4; pp. 70-82)
	W 10/4	Aggregation and Segregation – Part 4 (Ch 3.5-3.7; pp. 83-96)
8	M 10/9	Exam 2
	W 10/11	Lab 4 - Variables and Breeds
9	M 10/16	Random Walks and Mobile Entities – Part 1 (Ch 4.1, 4.2; pp. 97-110)
	W 10/18	Random Walks and Mobile Entities – Part 2 (Ch 4.3; pp. 111-119)
10	M 10/23	Random Walks and Mobile Entities – Part 3 (Ch 4.4, 4.5; pp. 119-132)
	W 10/25	Exam 3
11	M 10/30	Lab 5 - NetLogo and GIS data
	W 11/1	Percolation and Growth – Part 1 (Ch 5.1, 5.2; pp. 133-148)
12	M 11/6	Percolation and Growth – Part 2 (Ch 5.3; pp. 148-158)
	W 11/8	Percolation and Growth – Part 3 (Ch 5.3, 5.4; pp.148-168)
13	M 11/13	Lab 6 - Agent-based modeling
	W 11/15	Representing Time and Space (Ch 6; pp. 169-192)
14	M 11/20	Lab 7 - Using BehaviorSpace to manage experiments
	W 11/22	Thanksgiving (No class)
15	M 11/27	Model Uncertainty and Evaluation – Part 1 (Ch 7.1-7.3; pp. 193-211)

Week	Dates	Topics, Readings, Assignments, Deadlines
	W 11/29	Model Uncertainty and Evaluation – Part 2 (Ch 7.4-7.7; pp.211-228)
16	M 12/4	Review session
	W 12/6	Exam 4

THE OHIO STATE UNIVERSITY

SYLLABUS
GEOG 6226

Spatial Simulation and Modeling in GIS
Autumn 2023 (full term)
3 credit hours
Hybrid

COURSE OVERVIEW

Instructor

Instructor: Dr. Yang Song

Email address: (song.630@osu.edu)

Phone number: 614-292-2514

Office hours: TBD

Prerequisites

GEOG 5210 or consent of instructor

Course description

This course is about the use of computational techniques to simulate the evolution of complex spatial systems such as ecosystems, transportation, weather/climate, cities, economies, societies and landscapes. These and other complex systems have a multitude of relatively simple parts interacting over space and time to create surprising, emergent behaviors. Powerful computational techniques, often linked with GIS software, allow the simulation of realistically large systems at a fine-level of granularity, providing new insights that were unavailable through traditional modeling techniques.

This class meets twice a week for two 80-minute sessions.

We will explore three major types of "building-blocks" at the core of many dynamic spatial models: i) spatial aggregation and segregation processes, ii) random walks and mobile entities, and iii) percolation and growth processes. We will also discuss issues such as the role of spatial simulation in geographic information science, representation of space and time, how to build more complete models of human,

physical and linked human-physical dynamic spatial processes, and how to evaluate model performance and uncertainty.

Course learning outcomes

By the end of this course, students should successfully be able to:

- Understand the nature of complexity and complexity in nature
- Understand the nature of computational techniques
- Understand computational science as a tool for scientific investigation
- Understand and use spatial simulation techniques

General education course information

This is not a GE course.

HOW THIS ONLINE COURSE WORKS

Mode of delivery: This course is a hybrid course that is approximately 67% online. You are required to attend all the lab sections (see the schedule for the dates of these sections).

Pace of online activities: This course is divided into weekly modules that are released at least one week ahead of time. Students are expected to keep pace with weekly deadlines but may schedule their efforts freely within that time frame. All course materials, lectures, labs, exams, and participation opportunities can be found on the course website, under Modules, organized according to the week that they are assigned.

Credit hours and work expectations: This is a **3-credit-hour course**. According to Ohio State policy (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

Attendance and participation requirements: Because this is a hybrid course, part of your attendance is based on your online activity and participation. The following is a summary of students' expected participation:

- **Participating in online activities for attendance**: **AT LEAST ONCE PER WEEK**
  You are expected to log in to the course in Carmen every week. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible.*
- **Office hours and live sessions**: **OPTIONAL**
  All live, scheduled events for the course, including my office hours, are optional.

- **Participating in discussion forums**: **ONE OR MORE TIMES PER WEEK**
  Each week, we will post at least one question that will require students to respond on a Carmen discussion board. Each student must respond at least once to the question in a meaning way by, for example, providing materials to support the statements or arguments raised in the posted question, or discussing real-world applications that may support or counter the statements in the question. We will also encourage students to raise their own questions and respond to posts from others.

COURSE MATERIALS AND TECHNOLOGIES

Textbooks

Required

- O'Sullivan, D. and Perry, G. (2013) Spatial Simulation: Exploring Pattern and Process, Wiley. Available at university bookstore; also available in e-book format from Amazon.

- Additional readings and webpages will be posted at the Canvas course website. These resources will provide additional background material as well as deeper dives into the science behind the models discussed in class.

Other fees or requirements

- N/A

Course technology

Technology support

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** ocio.osu.edu/help
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu
- **TDD:** 614-688-8743

Technology skills needed for this course

- Basic computer and web-browsing skills

- Navigating Carmen (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)
- Recording a slide presentation with audio narration (go.osu.edu/video-assignment-guide)
- Recording, editing, and uploading video (go.osu.edu/video-assignment-guide)

Required equipment

- Computer: current Mac (MacOs) or PC (Windows 10) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed and tested
- Microphone: built-in laptop or tablet mic or external microphone
- Other: a mobile device (smartphone or tablet) to use for BuckeyePass authentication

Required software

Please keep in mind that you are NOT required to purchase any software for this class. The following list should help you access the software that is either open-source (NetLogo and its models) and free-of-cost to you as a student in this class.

- NetLogo
  - It will be available on the computers in our lab. However, since it is free and open source, you can download and install NetLogo on your personal machines: https://ccl.northwestern.edu/netlogo/ *However, note that you are on your own with installations on personal machines; we cannot provide technical support*.
  - The basic NetLogo install is simple, but some of the programs we will look at this semester will use the *gradient* extension. Installing the gradient extension is easy: go to this link, download and unzip the folder called *gradient* containing a single file called *gradient.jar*. Copy the entire folder to the same folder as your NetLogo models, or to the NetLogo *extensions* folder.   (Some NetLogo models also require an R extension for data analysis and reporting, but we will not be using these models.) For more details on these extensions, see the textbook authors' website: http://patternandprocess.org/. You can also follow NetLogo on Twitter: https://twitter.com/NetLogo.
  - System requirements of Netlogo can be found here. There are no official privacy policies from developers of QGIS.
- NetLogo models
  - Since it is open source, NetLogo comes with a wealth of freely available models (programs) across a wide range of applications. Models sources include:
    - Models Library - available in the NetLogo software itself; look under "Files" → "Models Library"
    - User community: https://ccl.northwestern.edu/netlogo/models/community/
- Models discussed in the textbook

- o The O'Sullivan and Perry text references and discusses a large number of NetLogo models. You should experiment with these models as part of your study *prior to class*. We will also work with some of these models in class.
  - o Windows versions of the NetLogo models are available at the Canvas site: unzip the archive and copy the entire directory (including the gradient subdirectory) to your laptop or to a portable storage device for use during class.
  - o Other sources for the NetLogo models, including Mac versions, include:
    - ▪ The authors' website, **Pattern and Process**: http://patternandprocess.org/.
    - ▪ O'Sullivan also maintains the most up-to-date versions of these models at a github repository: https://github.com/DOSull/model-zoo. (Note that the github repository may be incomplete: some models from the textbook may be missing.)
- Proctorio: A software to monitor online exams. More details can be found here.
- Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Full instructions for downloading and installation can be found at go.osu.edu/office365help.

Carmen access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:
- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions (go.osu.edu/add-device).
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application (go.osu.edu/install-duo) to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357(HELP) and IT support staff will work out a solution with you.

GRADING AND FACULTY RESPONSE

How your grade is calculated

ASSIGNMENT CATEGORY	POINTS

Lab assignments	50
Exams	50
Total	**100**

See course schedule below for due dates.

Descriptions of major course assignments

Lab assignments

There will be a series of NetLogo-based lab assignments throughout the semester. All lab assignments will be submitted via the course website and count toward your final grade of the course. Most lab assignments are due one week after each lab session (at 6:00pm of the due day). Lab 4 will be given two weeks to finish. All materials required for the lab assignments (NetLogo software, lecture notes, and other models) are available online or on Carmen. The lab assignments can be completed using students' own computers.

Students must finish their lab assignments individually. The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of lab assignments is encouraged, remember that comparing answers on an assignment is not permitted. If you're unsure about a particular situation, please ask ahead of time.

Exams

There will be 4 short examinations (20 -25 questions) during the semester. Exam questions will be drawn from the lectures, the textbook, and labs. Exams will be using Carmen during the scheduled time, unless you have informed your instructor before the exam with proper reasons and documents, and have received permission from the instructor prior to the exam. You are expected to finish all exams on time. At the end of the scheduled class time, you are to stop working and turn in your exam. You may not continue working on your exam after the scheduled class time.

Students must complete these exams yourself, without any external help or communication. Weekly quizzes are included as self-checks without points attached but are still expected to be completed on your own.

Late assignments

Lab assignments will be penalized 10% for each day late. Please refer to Carmen for due dates. Extensions will not be granted due to lost work. Be sure you back up and keep all your work.

Grading scale

A	93-100%	B-	80-82%	D+	67-69%
A-	90-92%	C+	77-79%	D	60-66%
B+	97-89%	C	73-76%	E	0-59%
B	83-86%	C-	70-72%		

Your final grade as seen on the course website will be rounded to the nearest whole number (e.g. an 89.49 is a B+ while an 89.50 is an A) before being submitted to the University Registrar at the end of the semester.

Instructor feedback and response time

You are responsible for all course related emails, so be sure to check your inbox on a daily basis. When emailing your instructor or TA, please always begin the subject of the email with the course number (GEOG6226) and your name (first name followed by last name). This is important as your instructor and TA teach multiple classes and need to know to which class you are referring. A proper email subject should be like this: GEOG6226_John Smith_Schedule a make-up exam.

I am providing the following list to give you an idea of my intended availability throughout the course. Remember that you can call **614-688-4357(HELP)** at any time if you have a technical problem.

- **Grading and feedback:** For large weekly assignments, you can generally expect feedback within **7 days**.

- **Email:** I will reply to emails within **24 hours on days when class is in session at the university**.

- **Discussion board:** I will check and reply to messages in the discussion boards every **24 hours on school days**.

OTHER COURSE POLICIES

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style**: While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics.
- **Tone and civility**: Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.

- **Citing your sources**: When we have academic discussions, please cite your sources to back up what you say. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.
- **Backing up your work**: Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Academic integrity policy

See **Descriptions of major course assignments**, above, for my specific guidelines about collaboration and academic integrity in the context of this class.

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct **http://studentlife.osu.edu/csc/**.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct web page (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)

Student Services and Advising

University Student Services can be accessed through BuckeyeLink. More information is available here: https://contactbuckeyelink.osu.edu/

FOR UNDERGRAD COURSES: Advising resources for students are available here: http://advising.osu.edu

FOR GRADUATE COURSES: Please contact your graduate program coordinator for advising assistance.

Copyright for instructional materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on Title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at http://titleix.osu.edu or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu

Commitment to a diverse and inclusive learning environment

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Land Acknowledgement

We would like to acknowledge the land that The Ohio State University occupies is the ancestral and contemporary territory of the Shawnee, Potawatomi, Delaware, Miami, Peoria, Seneca, Wyandotte, Ojibwe and Cherokee peoples. Specifically, the university resides on land ceded in the 1795 Treaty of Greeneville and the forced removal of tribes through the Indian Removal Act of 1830. I/We want to honor the resiliency of these tribal nations and recognize the historical contexts that has and continues to affect the Indigenous peoples of this land.

More information on OSU's land acknowledgement can be found here:

https://mcc.osu.edu/about-us/land-acknowledgement

Your mental health

As a student you may experience a range of issues that can cause barriers to learn, 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 a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand. You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

ACCESSIBILITY ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Requesting accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** slds@osu.edu; 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This online course requires use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- Canvas accessibility (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- CarmenZoom accessibility (go.osu.edu/zoom-accessibility)
- Collaborative course tools

COURSE SCHEDULE

Refer to the Carmen course for up-to-date assignment due dates.

Week	Dates	Topics, Readings, Assignments, Deadlines
1	M 8/23	Course overview Lab 1 – Experimenting with NetLogo
2	M 8/28 W 8/30	Spatial Simulation Models - Part 1 (Ch 1.1, 1.2; pp. 1-14) Spatial Simulation Models – Part 2 (Ch 1.3, 1.4; pp. 14-28)
3	M 9/4 W 9/6	Labor Day (No class) Lab 2 – NetLogo world and agents
4	M 9/11 W 9/13	Pattern, Process and Scale – Part 1 (Ch 2.1, 2.2; pp. 30-45) Pattern, Process and Scale – Part 2 (Ch 2.2; pp. 46-56)
5	M 9/18 W 9/20	Exam 1 Lab 3 - Programming with NetLogo
6	M 9/25 W9/27	Aggregation and Segregation – Part 1 (Ch 3.1, 3.2; pp. 58-63) Aggregation and Segregation – Part 2 (Ch 3.3; pp.64-69)
7	M 10/2 W 10/4	Aggregation and Segregation – Part 3 (Ch 3.4; pp. 70-82) Aggregation and Segregation – Part 4 (Ch 3.5-3.7; pp. 83-96)
8	M 10/9 W 10/11	Exam 2 Lab 4 - Variables and Breeds
9	M 10/16 W 10/18	Random Walks and Mobile Entities – Part 1 (Ch 4.1, 4.2; pp. 97-110) Random Walks and Mobile Entities – Part 2 (Ch 4.3; pp. 111-119)
10	M 10/23 W 10/25	Random Walks and Mobile Entities – Part 3 (Ch 4.4, 4.5; pp. 119-132) Exam 3
11	M 10/30 W 11/1	Lab 5 - NetLogo and GIS data Percolation and Growth – Part 1 (Ch 5.1, 5.2; pp. 133-148)
12	M 11/6 W 11/8	Percolation and Growth – Part 2 (Ch 5.3; pp. 148-158) Percolation and Growth – Part 3 (Ch 5.3, 5.4; pp.148-168)
13	M 11/13 W 11/15	Lab 6 - Agent-based modeling Representing Time and Space (Ch 6; pp. 169-192)

Week	Dates	Topics, Readings, Assignments, Deadlines
14	M 11/20	Lab 7 - Using BehaviorSpace to manage experiments
	W 11/22	Thanksgiving (No class)
15	M 11/27	Model Uncertainty and Evaluation – Part 1 (Ch 7.1-7.3; pp. 193-211)
	W 11/29	Model Uncertainty and Evaluation – Part 2 (Ch 7.4-7.7; pp.211-228)
16	M 12/4	Review session
	W 12/6	Exam 4

THE OHIO STATE UNIVERSITY

SYLLABUS
GEOG 6226

Spatial Simulation and Modeling in GIS
Autumn 2023 (full term)
3 credit hours
In-person

COURSE OVERVIEW

Instructor

Instructor: Dr. Yang Song

Email address: (song.630@osu.edu)

Phone number: 614-292-2514

Office hours: TBD

Prerequisites

GEOG 5210 or consent of instructor

Course description

This course is about the use of computational techniques to simulate the evolution of complex spatial systems such as ecosystems, transportation, weather/climate, cities, economies, societies and landscapes. These and other complex systems have a multitude of relatively simple parts interacting over space and time to create surprising, emergent behaviors. Powerful computational techniques, often linked with GIS software, allow the simulation of realistically large systems at a fine-level of granularity, providing new insights that were unavailable through traditional modeling techniques.

This class meets twice a week for two 80-minute sessions.

We will explore three major types of "building-blocks" at the core of many dynamic spatial models: i) spatial aggregation and segregation processes, ii) random walks and mobile entities, and iii) percolation and growth processes. We will also discuss issues such as the role of spatial simulation in geographic information science, representation of space and time, how to build more complete models of human,

physical and linked human-physical dynamic spatial processes, and how to evaluate model performance and uncertainty.

Course learning outcomes

By the end of this course, students should successfully be able to:

- Understand the nature of complexity and complexity in nature
- Understand the nature of computational techniques
- Understand computational science as a tool for scientific investigation
- Understand and use spatial simulation techniques

General education course information

This is not a GE course.

COURSE MATERIALS AND TECHNOLOGIES

Textbooks

Required

- O'Sullivan, D. and Perry, G. (2013) Spatial Simulation: Exploring Pattern and Process, Wiley. Available at university bookstore; also available in e-book format from Amazon.

- Additional readings and webpages will be posted at the Canvas course website. These resources will provide additional background material as well as deeper dives into the science behind the models discussed in class.

Other fees or requirements

- N/A

Course technology

Technology support

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

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Technology skills needed for this course

- Basic computer and web-browsing skills
- Navigating Carmen (go.osu.edu/canvasstudent)

Required equipment

- Computer: current Mac (MacOs) or PC (Windows 10) with high-speed internet connection
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Required software

Please keep in mind that you are NOT required to purchase any software for this class. The following list should help you access the software that is either open-source (NetLogo and its models) and free-of-cost to you as a student in this class.

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  - It will be available on the computers in our lab. However, since it is free and open source, you can download and install NetLogo on your personal machines: https://ccl.northwestern.edu/netlogo/ *However, note that you are on your own with installations on personal machines; we cannot provide technical support*.
  - The basic NetLogo install is simple, but some of the programs we will look at this semester will use the *gradient* extension. Installing the gradient extension is easy: go to this link, download and unzip the folder called *gradient* containing a single file called *gradient.jar*. Copy the entire folder to the same folder as your NetLogo models, or to the NetLogo *extensions* folder.   (Some NetLogo models also require an R extension for data analysis and reporting, but we will not be using these models.) For more details on these extensions, see the textbook authors' website: http://patternandprocess.org/. You can also follow NetLogo on Twitter: https://twitter.com/NetLogo.
  - System requirements of Netlogo can be found here. There are no official privacy policies from developers of QGIS.
- NetLogo models
  - Since it is open source, NetLogo comes with a wealth of freely available models (programs) across a wide range of applications. Models sources include:
    - Models Library - available in the NetLogo software itself; look under "Files" → "Models Library"

- User community: https://ccl.northwestern.edu/netlogo/models/community/
- Models discussed in the textbook
  - The O'Sullivan and Perry text references and discusses a large number of NetLogo models. You should experiment with these models as part of your study *prior to class*. We will also work with some of these models in class.
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    - The authors' website, **Pattern and Process**: http://patternandprocess.org/.
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If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357(HELP) and IT support staff will work out a solution with you.

GRADING AND FACULTY RESPONSE

How your grade is calculated

ASSIGNMENT CATEGORY	POINTS
Lab assignments	50
Exams	50
Total	**100**

See course schedule below for due dates.

Descriptions of major course assignments

Lab assignments

There will be a series of NetLogo-based lab assignments throughout the semester. All lab assignments will be submitted via the course website and count toward your final grade of the course. Most lab assignments are due one week after each lab session (at 6:00pm of the due day). Lab 4 will be given two weeks to finish. All materials required for the lab assignments (NetLogo software, lecture notes, and other models) are available online or on Carmen. The lab assignments can be completed using students' own computers.

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There will be 4 short examinations (20 -25 questions) during the semester. Exam questions will be drawn from the lectures, the textbook, and labs. Exams will be using Carmen during the scheduled time, unless you have informed your instructor before the exam with proper reasons and documents, and have received permission from the instructor prior to the exam. You are expected to finish all exams on time. At the end of the scheduled class time, you are to stop working and turn in your exam. You may not continue working on your exam after the scheduled class time.

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Lab assignments will be penalized 10% for each day late. Please refer to Carmen for due dates. Extensions will not be granted due to lost work. Be sure you back up and keep all your work.

Grading scale

A	93-100%	B-	80-82%	D+	67-69%
A-	90-92%	C+	77-79%	D	60-66%
B+	97-89%	C	73-76%	E	0-59%
B	83-86%	C-	70-72%		

Your final grade as seen on the course website will be rounded to the nearest whole number (e.g. an 89.49 is a B+ while an 89.50 is an A) before being submitted to the University Registrar at the end of the semester.

Instructor feedback and response time

You are responsible for all course related emails, so be sure to check your inbox on a daily basis. When emailing your instructor or TA, please always begin the subject of the email with the course number (GEOG6226) and your name (first name followed by last name). This is important as your instructor and TA teach multiple classes and need to know to which class you are referring. A proper email subject should be like this: GEOG6226_John Smith_Schedule a make-up exam.

I am providing the following list to give you an idea of my intended availability throughout the course. Remember that you can call **614-688-4357(HELP)** at any time if you have a technical problem.

- **Grading and feedback:** For large weekly assignments, you can generally expect feedback within **7 days**.

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OTHER COURSE POLICIES

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style**: While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics.
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- **Backing up your work**: Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Academic integrity policy

See **Descriptions of major course assignments**, above, for my specific guidelines about collaboration and academic integrity in the context of this class.

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct **http://studentlife.osu.edu/csc/**.

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Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct web page (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)

Student Services and Advising

University Student Services can be accessed through BuckeyeLink. More information is available here: https://contactbuckeyelink.osu.edu/

FOR UNDERGRAD COURSES: Advising resources for students are available here: http://advising.osu.edu

FOR GRADUATE COURSES: Please contact your graduate program coordinator for advising assistance.

Copyright for instructional materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on Title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at http://titleix.osu.edu or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu

Commitment to a diverse and inclusive learning environment

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Land Acknowledgement

We would like to acknowledge the land that The Ohio State University occupies is the ancestral and contemporary territory of the Shawnee, Potawatomi, Delaware, Miami, Peoria, Seneca, Wyandotte, Ojibwe and Cherokee peoples. Specifically, the university resides on land ceded in the 1795 Treaty of Greeneville and the forced removal of tribes through the Indian Removal Act of 1830. I/We want to honor the resiliency of these tribal nations and recognize the historical contexts that has and continues to affect the Indigenous peoples of this land.

More information on OSU's land acknowledgement can be found here:

https://mcc.osu.edu/about-us/land-acknowledgement

Your mental health

As a student you may experience a range of issues that can cause barriers to learn, 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 a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand. You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

ACCESSIBILITY ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Requesting accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** slds@osu.edu; 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This course requires use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- Canvas accessibility (go.osu.edu/canvas-accessibility)

COURSE SCHEDULE

Refer to the Carmen course for up-to-date assignment due dates.

Week	Dates	Topics, Readings, Assignments, Deadlines
1	M 8/23	Course overview Lab 1 – Experimenting with NetLogo
2	M 8/28 W 8/30	Spatial Simulation Models - Part 1 (Ch 1.1, 1.2; pp. 1-14) Spatial Simulation Models – Part 2 (Ch 1.3, 1.4; pp. 14-28)
3	M 9/4 W 9/6	Labor Day (No class) Lab 2 – NetLogo world and agents
4	M 9/11 W 9/13	Pattern, Process and Scale – Part 1 (Ch 2.1, 2.2; pp. 30-45) Pattern, Process and Scale – Part 2 (Ch 2.2; pp. 46-56)
5	M 9/18 W 9/20	Exam 1 Lab 3 - Programming with NetLogo
6	M 9/25 W9/27	Aggregation and Segregation – Part 1 (Ch 3.1, 3.2; pp. 58-63) Aggregation and Segregation – Part 2 (Ch 3.3; pp.64-69)
7	M 10/2 W 10/4	Aggregation and Segregation – Part 3 (Ch 3.4; pp. 70-82) Aggregation and Segregation – Part 4 (Ch 3.5-3.7; pp. 83-96)
8	M 10/9 W 10/11	Exam 2 Lab 4 - Variables and Breeds
9	M 10/16 W 10/18	Random Walks and Mobile Entities – Part 1 (Ch 4.1, 4.2; pp. 97-110) Random Walks and Mobile Entities – Part 2 (Ch 4.3; pp. 111-119)
10	M 10/23 W 10/25	Random Walks and Mobile Entities – Part 3 (Ch 4.4, 4.5; pp. 119-132) Exam 3
11	M 10/30 W 11/1	Lab 5 - NetLogo and GIS data Percolation and Growth – Part 1 (Ch 5.1, 5.2; pp. 133-148)
12	M 11/6 W 11/8	Percolation and Growth – Part 2 (Ch 5.3; pp. 148-158) Percolation and Growth – Part 3 (Ch 5.3, 5.4; pp.148-168)
13	M 11/13 W 11/15	Lab 6 - Agent-based modeling Representing Time and Space (Ch 6; pp. 169-192)
14	M 11/20	Lab 7 - Using BehaviorSpace to manage experiments

Week	Dates	Topics, Readings, Assignments, Deadlines
	W 11/22	Thanksgiving (No class)
15	M 11/27	Model Uncertainty and Evaluation – Part 1 (Ch 7.1-7.3; pp. 193-211)
	W 11/29	Model Uncertainty and Evaluation – Part 2 (Ch 7.4-7.7; pp.211-228)
16	M 12/4	Review session
	W 12/6	Exam 4

Geography Curriculum Mapping: Summary of Changes

Ningchuan Xiao
November 8, 2021

The Department of Geography is proposing to change our undergraduate Geographic Information Science (GIS) major and to create a new professional masters degree in Geographic Information Science and Technology. The department went through an undergraduate curriculum mapping process in 2019 and 2020. Throughout the process, the faculty have agreed upon a set of program goals, outcomes, and proficiencies, which are detailed in the left column in the attached PDF file (Curriculum_map_GEOG_GIS_ONLY.pdf). After the proficiencies were set, the faculty then mapped their courses to each of the proficiencies. The attached spreadsheet in PDF includes the mapping result for the courses of the Geographic Information Science (GIS) major, under the grouped column called GIS.

It became clear to the GIS faculty that proficiencies under Goals D and E are not sufficiently covered in the current curriculum by our required courses nor by the electives. This is one of the motivations we decided to revise our GIS major curriculum. The courses in the revised curriculum are listed in the attached PDF (under a grouped column called GIS 2).

There are a few main changes in the new curriculum. First, a new course GEOG 5101 (GIST Professionalism and Ethics) is added to provide sufficient coverage of proficiencies in Goals D and E. Second, the new curriculum has a set of 5 core courses that are required, a set of 6 intermediate courses from which students must take at least 3, and several options for students to focus on different substantive areas such as urban and sustainability (see the attached curriculum map for details). Third, two courses in the current curriculum, 5223 and 5226, become 6000 level courses that will be used in a new professional masters program, which will be proposed soon. The following table shows the coverages of the program proficiencies of the current and new curriculums (please note because the electives in the new curriculum have different options, only the core and immediate courses are summarized in the table). It clearly shows sufficient coverage for proficiencies in Goals D and E by the proposed curriculum. Also, the curriculum changes do not affect the proficiencies that are already covered, with the only exception in proficiencies A1c and A1d that are covered by the current electives but not by the core or intermediate courses in the proposed. However, these two proficiencies are covered by most electives (see the attached spreadsheet in PDF). One benefit of moving two 5000 level courses to 6000 level is that such change makes it possible for the department to develop a new professional masters degree in GIS with graduate level courses (the proposal for this program will be submitted soon in Autumn 2021).

Table 1. Coverage of the proficiencies by the courses of the current GIS curriculum (Required and Electives) and the proposed new GIS curriculum. Numbers are the number of times each proficiency is covered by the courses labeled in each column. The actual proficiency descriptions can be found in the attached curriculum map PDF. Electives for the proposed curriculum are not listed, but can be found in the attached spreadsheet in PDF.

Goals	Outcomes	Proficiencies	Current		New	
			Required	Electives	Core	Intermediate
A: Human, Environmental, and Spatial Concepts	1. Conceptualize human, environmental, or spatial problems	a.	2	0	1	1
		b.	3	2	2	2
		c.	0	**1**	0	0
		d.	0	**1**	0	0

		e.	0	2	0	1
	2. Critically evaluate different approaches to describe, explain, or predict real-world experience	a.	8	2	5	4
		b.	2	0	1	1
		c.	5	1	3	3
	3. Appraise the relation between concepts and real-world experience	a.	3	3	3	2
		b.	1	0	1	1
		c.	**0**	**0**	1	0
		d.	0	2	1	1
B: Research Strategies, Methods, and Data	1. Gather information regarding data and their context to draw conclusions	a.	3	0	2	1
		b.	2	0	1	1
		c.	2	0	2	0
		d.	**0**	**0**	1	0
	2. Evaluate research strategies and methods to engage problems	a.	2	1	1	2
		b.	1	0	1	0
		c.	**0**	**0**	1	0
		d.	2	1	1	2
	3. Apply strategies and methods	a.	8	3	4	5
		b.	3	1	3	2
		c.	0	0	0	0
		d.	**0**	**0**	1	0
		e.	4	1	1	3
		f.	5	2	3	4
		g.	0	1	1	2
		h.	6	3	3	5
C: Communication and Engagement	1. Disseminate knowledges	a.	2	0	0	1
		b.	0	0	1	0
		c.	0	0	1	0
		d.	0	1	1	1
		e.	0	1	1	1
		f.	0	0	0	0
		g.	2	2	0	3
		h.	0	0	0	0
		i.	0	0	0	0
		j.	0	0	0	0
	2. Collaborate in learning and research	a.	0	0	0	0
		b.	0	0	0	0
		c.	0	0	0	0
		d.	0	1	0	1
D: Critical Thinking and Ethical Engagement	1. Critically engage real-world problems	a.	2	0	1	1
		b.	2	0	1	1
		c.	**0**	**0**	1	0
		d.	**0**	**0**	1	0
		e.	1	0	1	1
	2. Appraise ethical issues in research	a.	1	0	1	0
		b.	1	0	1	0
		c.	**0**	**0**	1	0
		d.	**0**	**0**	1	0
		e.	1	0	1	0

E: Professional Development	1. Make use of their values to guide their careers	a.	**0**	**0**	1	0
		b.	**0**	1	1	1
		c.	**0**	**0**	1	0
	2. Deploy their skills relative to a changing job market	a.	**0**	**0**	1	0
		b.	**0**	**0**	1	0
		c.	0	1	1	1
	3. Creatively use skills to solve problems beyond those encountered in formal training	a.	1	2	1	3
		b.	1	0	1	1
		c.	1	0	1	1

Campus

Column groups: **GIS** | **GIS 2 (to be proposed)**

Course columns (partial): Geog 4103, 5201, 5200, 5201, 5202, 5203, 5225, 5225, 5225 | Geog 4101, 5209, 5213, 5226 | Geog 4103, 5200, 5201, 5205, 5201 (Core) | Geog 4101, 5209, 5213, 5226, 5229 (Intermediate) | Geog 5501, 5502, 5503, 5530, 5531 (Urban) | Geog 3970, 3782, 3840, 4720, 3780, 4823 (Sustainability)

The following reproduces the proficiency row labels (Goals A–E) with the bold **Total "y"** count columns, read left-to-right as they appear across the sheet's summary columns (GIS Required; GIS secondary group; GIS2 Core; GIS2 Intermediate & cumulative; Urban & cumulative; Geog 3970 group & final total).

Proficiency	GIS Req	GIS 2nd	Core	Int	Int cum	Urban	Urban cum	3970	Total
Goal A: Human, Environmental, and Spatial Concepts — Students understand various conceptual approaches and their context to interpret patterns, processes and their relation.									
1. Conceptualize human, environmental, or spatial problems									
a. Describe the spatial and historical context of a problem (B)	2	0	1	1	2	5	7	7	9
b. Identify the 'ecological fallacy' (the inappropriate homogenization or aggregation of differentiated phenomena within a unit of analysis, using scale as an analytical unit) (B)	3	2	2	2	4	2	6	1	5
c. Examine dynamics within a place's or system's boundaries, and implications for real-world problems (I)	0	1	0	0	0	4	4	7	7
d. Examine dynamics that connect places or systems across space, and implications for real-world problems (I)	0	1	0	0	0	5	5	7	7
e. Evaluate processes that operate at different scales and their effects (A)	0	2	0	1	1	5	6	5	6
2. Critically evaluate different approaches to describe, explain, or predict real-world experience									
a. Describe the strengths and weaknesses of various approaches for their utility in interpreting real-world experience (B, I)	8	2	5	4	9	3	12	6	15
b. Explain the contexts in which various approaches were developed (A)	2	0	1	1	2	3	5	2	4
c. Critically evaluate various approaches in their field of study (A)	5	1	3	3	6	3	9	4	10
3. Appraise the relation between concepts and real-world experience									
a. Interpret patterns (B)	3	3	3	2	4	4	8	4	8
b. Critique how knowledges in their fields are used in developing solutions to real-world problems (I)	1	0	1	1	1	3	5	4	6
c. Relate research findings to debates about different approaches to research (A)	0	0	1	0	1	3	4	2	3
d. Relate patterns to processes to assess causal relations (A)	0	2	1	1	2	3	5	2	4
Goal B: Research Strategies, Methods and Data — Students are able to apply appropriate methods and data, to transform data into actionable knowledges to support ethical scholarship and decision making.									
1. Gather information regarding data and their context to draw conclusions									
a. Identify relevant data sources and their quality (B)	3	0	2	1	3	1	4	1	4
b. Collect data from relevant sources (I)	2	0	1	1	2	1	3	1	3
c. Design feasible data-collection procedures (I)	2	0	2	0	2	1	3	1	3
d. Explain how context shapes conclusions drawn from data (A)	0	0	1	0	1	1	2	1	2
2. Evaluate research strategies and methods to engage problems									
a. Identify available research strategies and methods (B)	2	1	1	2	3	3	6	1	4
b. Explain how strategies and methods may be used constructively and destructively in real-world applications (B, I)	1	0	1	0	1	2	3	1	2
c. Provide empirical examples of constructive and destructive applications of methods (I, A)	0	0	1	0	1	1	2	0	1
d. Assess the strengths and limitations of available research strategies and methods (I, A)	2	1	1	2	3	1	4	0	3
3. Apply strategies and methods									
a. Visualize patterns through mapping, graphing, or using GIS techniques (B)	8	3	4	5	8	1	9	1	9
b. Identify sources of uncertainty or partial knowledges (B, I)	1	1	3	2	5	0	5	0	5
c. Analyze how errors propagate through data processing (I)	0	0	0	0	0	0	0	0	0
d. Examine the impacts of sources of uncertainty or partial knowledges on the reliability of data (I)	0	0	1	0	1	0	1	0	1
e. Apply interactive and dynamic visualization techniques (I, A)	4	1	1	0	1	0	3	0	3
f. Analyze patterns using appropriate methods (I, A)	5	2	3	3	6	0	6	0	6
g. Apply strategies to mitigate or constructively engage the effects of uncertainty or partial knowledges (A)	0	1	1	1	2	0	2	0	2
h. Interpret data and results using appropriate methods (A)	6	3	3	5	7	1	8	1	8
Goal C: Communication and Engagement — The successful student will be able to share and receive knowledge by engaging with diverse audiences, participants, and stakeholders.									
1. Disseminate knowledges									
a. Identify modes by which knowledges can be disseminated (B)	2	0	0	1	1	0	1	0	1
b. Recognize that different audiences will have different degrees of familiarity with subject being presented (B)	0	0	1	0	1	1	2	1	2
c. Summarize an author's argument in their own words (B)	0	0	1	0	1	5	6	5	6
d. Deliver oral presentations (B)	0	0	1	1	1	5	6	3	4
e. Adjust the language and technical level of oral or written presentation relative to different audiences (B, I)	0	1	1	1	1	1	2	1	2
f. Evaluate the standard modes of dissemination of knowledges for their strengths and weaknesses in a given context (I)	0	0	0	0	0	0	0	0	0
g. Use visual methods to enhance oral or written presentation (B, I)	2	2	0	3	2	3	5	3	5
h. Construct other output or products using diverse media, art, activism, or other strategies to convey messages from academic research (I)	0	0	0	0	0	1	1	1	1
i. Synthesize material from several sources (I)	0	0	0	0	0	5	5	4	4
j. Generate a document that develops an argument drawing from multiple sources (A)	0	0	0	0	0	5	5	4	4
2. Collaborate in learning and research									
a. Demonstrate responsiveness to others (B)	0	0	0	1	0	3	3	3	3
b. Demonstrate ability to work with a division of labor in a collaborative project (B, I)	0	0	0	0	0	2	2	3	3
c. Demonstrate ability to work with people of varying cultures, backgrounds, abilities, ideas, ideals, and status (B, I)	0	0	0	1	0	2	2	2	2
d. Employ teamwork to achieve results (B, I, A)	0	1	0	1	0	2	2	3	3
Goal D: Critical Thinking and Ethical Engagement — The successful student is intellectually curious, interested in scrutinizing their assumptions, and is aware of the ethical dimensions of their professional activity regarding real-world problems to work towards justice.									
1. Critically engage real-world problems									
a. Identify multiple sides of a problem (B)	2	0	1	1	2	5	7	5	7
b. Explain multiple sides of a problem (I)	2	0	1	1	2	4	6	6	8
c. Explain the real-world consequences of different positions regarding a problem (A)	0	0	1	0	1	2	3	5	6
d. Develop a position based on an understanding of multiple sides of a problem (A)	0	0	0	0	1	2	3	5	6
e. Identify linkages among apparently discrete problems (A)	1	0	1	1	2	1	3	3	5
2. Appraise ethical issues in research									
a. Explain how strategies and methods may be used constructively and destructively in real-world applications (B, I) [identical to b.2.b]	1	0	1	0	1	2	3	2	3
b. Perceive that everyone, including researchers, implicitly have biases and partial knowledges that can have negative effects on subjects under study (B, I)	0	0	1	0	1	3	4	2	3
c. Perceive that subjects under study and those encountered in the field, their values, and their privacy require respect (B, I)	0	0	1	0	1	0	1	0	1
d. Analyze their positionality regarding, for example, class, race/ethnicity, gender, age, citizenship, occupation, and the like relative those under study or encountered in the field (I, A)	0	0	0	0	1	0	1	0	1
e. Integrate ethical considerations into formulation of questions and applications of their knowledges (S)	1	0	1	0	1	0	1	0	1
Goal E: Professional Development — The successful student understands how to make use of the skills and knowledges developed in their undergraduate program towards securing a job and pursuing a career.									
1. Make use of their values to guide their careers									
a. Identify their value systems relative to career opportunities (B)	0	0	1	1	0	0	1	0	1
b. Describe tensions between their ideals and career realities (I)	0	1	1	1	2	0	2	0	2
c. Appraise the variety of options and trade-offs in career paths relative to their value systems (A)	0	0	1	0	1	0	1	0	1
2. Deploy their skills relative to a changing job market									
a. Identify the range of their skills relative to a variety of career paths (B)	0	0	1	0	1	0	1	0	1
b. Identify the strengths and limitations of their range of skills relative to various professional opportunities (I)	0	0	1	0	1	0	1	0	1
c. Demonstrate the ability to learn new skills (A)	0	1	1	1	1	2	1	3
3. Creatively use skills to solve problems beyond those encountered in formal training									
a. Apply knowledge from formal training to examine a problem (B)	1	2	1	1	3	4	1	5	0	4
b. Integrate diverse skills from formal training (I)	1	0	1	1	1	3	0	2
c. Integrate knowledges from formal training with those acquired independently (A)	1	0	1	1	2	0	2	0	2

Arts and Sciences Distance Learning Course Component Technical Review Checklist

Course: Geog 6226 DL
Instructor: Yang Song
Summary: Spatial Simulation and Modeling in GIS

Standard - Course Technology	Yes	Yes with Revisions	No	Feedback/ Recomm.
6.1 The tools used in the course support the learning objectives and competencies.	X			• Carmen • Office 365 • NetLogo
6.2 Course tools promote learner engagement and active learning.	X			• Carmen Discussion Boards • Zoom • Proctorio
6.3 Technologies required in the course are readily obtainable.	X			All are available for free via OSU agreements.
6.4 The course technologies are current.	X			All are updated regularly
6.5 Links are provided to privacy policies for all external tools required in the course.	X			No third party tools requiring an account are used.
Standard - Learner Support				
7.1 The course instructions articulate or link to a clear description of the technical support offered and how to access it.	X			Links to 8HELP are provided.
7.2 Course instructions articulate or link to the institution's accessibility policies and services.	X			a
7.3 Course instructions articulate or link to an explanation of how the institution's academic support services and resources can help learners succeed in the course and how learners can obtain them.		X		Add statement b
7.4 Course instructions articulate or link to an explanation of how the institution's student services and resources can help learners succeed and how learners can obtain them.	X			c
Standard – Accessibility and Usability				
8.1 Course navigation facilitates ease of use.	X			Recommend using the Carmen Distance Learning "Master Course" template developed by ODEE and available in the Canvas Commons to provide student-users with a consistent user experience in terms of navigation and access to course content.
8.2 Information is provided about the accessibility of all technologies required in the course.	X			All technologies are covered by OSU policies.
8.3 The course provides alternative means of access to course materials in formats that meet the needs of diverse learners.	X			Instructions are present.
8.4 The course design facilitates readability	X			

8.5 Course multimedia facilitate ease of use.	X			All assignments and activities that use the Carmen LMS with embedded multimedia facilitates ease of use. All other multimedia resources facilitate ease of use by being available through a standard web browser

Reviewer Information
- Date reviewed: 10/5/20
- Reviewed by: Ian Anderson

Notes: Add dates to the weekly breakdown. Consider using the ASC DL Syllabus Template. Please specify method of office hours and online lectures (I presume both to be Zoom, but it should be stated).

[a]The following statement about disability services (recommended 16 point font): Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, slds@osu.edu; slds.osu.edu.

[b]Add to the syllabus this link with an overview and contact information for the student academic services offered on the OSU main campus. http://advising.osu.edu/welcome.shtml

[c]Add to the syllabus this link with an overview and contact information for student services offered on the OSU main campus. http://ssc.osu.edu. Also, consider including this link in the "Other Course Policies" section of the syllabus.