
Term Information

Effective Term Spring 2023

General Information

Course Bulletin Listing/Subject Area Horticulture and Crop Science
Fiscal Unit/Academic Org Horticulture & Crop Science - D1127
College/Academic Group Food, Agric & Environ Science
Level/Career Undergraduate
Course Number/Catalog 3586
Course Title Digital Agriculture Laboratory
Transcript Abbreviation DigitalAgLab
Course Description Digital Agriculture Laboratory provides an overview of the tools used for making management decisions based on data-driven processes in agriculture and food systems. This course seeks to provide experience working with large data sets (crop, animal, weather, environment, and capital asset management models, coupled with AI) using a variety of software tools for data analysis and visualization.
Semester Credit Hours/Units Fixed: 1

Offering Information

Length Of Course 14 Week, 12 Week
Flexibly Scheduled Course Never
Does any section of this course have a distance education component? No
Grading Basis Letter Grade
Repeatable No
Course Components Laboratory
Grade Roster Component Laboratory
Credit Available by Exam No
Admission Condition Course No
Off Campus Never
Campus of Offering Columbus, Lima, Mansfield, Marion, Newark, Wooster

Prerequisites and Exclusions

Prerequisites/Corequisites AGSYSMT 2580, AGSYSMT 3585 or HCS 3585 (or concurrent)
Exclusions AGSYSMT 3586
Electronically Enforced Yes

Cross-Listings

Cross-Listings AGSYSMT 3586

Subject/CIP Code

Subject/CIP Code 01.0301
Subsidy Level Baccalaureate Course
Intended Rank Sophomore, Junior, Senior

Requirement/Elective Designation

Sustainability

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 evolution of principles, theories, and methods of data-driven agriculture effects on sustainability and society.
- Gain experience with modern knowledge-based production technologies.
- Understand data-driven insights, meaningful interpretation of results, and effective ways to visualize and communicate the outcomes to the sustainable management of agriculture inputs, to the workforce and society.
- Understand the economic and environmental benefits of data driven agriculture for the producer, consumer, and society.

Content Topic List

- Data Precision, Accuracy and Outliers
- ArcGIS for mapping, analysis, and modelling
- Variable Rate Technology
- Yield Monitor Data: Cleaning and Processing
- Agricultural Machinery Data Collection, Decoding, and Processing
- Farm Data Interoperability
- Application of Google Earth in Digital Agriculture
- Remote Sensing and its application in Digital Agriculture
- Drones and their application in Digital Agriculture
- Introduction to R programming language and its application for on-farm research data analysis.
- Data Mining and Application of Big Data in Digital Agriculture
- Supply Chain Management in Digital Agriculture
- Application of Blockchain and Cryptocurrencies in Digital Agriculture

Sought Concurrence

Yes

Attachments

- HCS3585 GE justification Final_20211130.pdf: GE Justification
(Other Supporting Documentation. Owner: Luikart, Meredith Marie)
- AGSYSMT_HCS_3586_Syllabus_Final.docx: Syllabus
(Syllabus. Owner: Luikart, Meredith Marie)
- Course_Review_Concurrence_Animal_Sciences_AGSYSMT_HCS_3586_20211210.pdf: Concurrence
(Concurrence. Owner: Luikart, Meredith Marie)
- Course_Review_Concurrence_Civil_Environmental_Geodetic_Engineering_AGSYSMT_HCS_3585_and_3586.pdf: Concurrence
(Concurrence. Owner: Luikart, Meredith Marie)
- Course_Review_Concurrence_Geography_AGSYSMT_HCS_3585_and_3586.pdf: Concurrence
(Concurrence. Owner: Luikart, Meredith Marie)
- Course_Review_Concurrence_Knowlton Schl of Architecture_AGSYSMT_HCS_3585_and_3586.pdf: Concurrence
(Concurrence. Owner: Luikart, Meredith Marie)
- Course_Review_Concurrence_SENR_AGSYSMT_HCS_3586_20211210.pdf: Concurrence
(Concurrence. Owner: Luikart, Meredith Marie)

Comments

- Revise as per COAA via email message 7 February 2022

- Revise as discussed with K. Trefz on 27 January 2022

- Revise as per discussion 19 January 2022

- Revise as per discussion 6 January 2022 *(by Osborne, Jeanne Marie on 02/07/2022 04:30 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Luikart, Meredith Marie	12/10/2021 10:57 AM	Submitted for Approval
Approved	Barker, David John	12/13/2021 12:29 PM	Unit Approval
Revision Requested	Osborne, Jeanne Marie	01/06/2022 02:16 PM	College Approval
Submitted	Luikart, Meredith Marie	01/13/2022 02:12 PM	Submitted for Approval
Approved	Barker, David John	01/13/2022 03:14 PM	Unit Approval
Revision Requested	Osborne, Jeanne Marie	01/19/2022 02:12 PM	College Approval
Submitted	Luikart, Meredith Marie	01/25/2022 10:05 AM	Submitted for Approval
Approved	Gardner, David Sean	01/25/2022 10:10 AM	Unit Approval
Revision Requested	Osborne, Jeanne Marie	01/28/2022 10:29 AM	College Approval
Submitted	Luikart, Meredith Marie	02/02/2022 04:11 PM	Submitted for Approval
Approved	Barker, David John	02/03/2022 12:45 PM	Unit Approval
Revision Requested	Osborne, Jeanne Marie	02/07/2022 04:30 PM	College Approval
Submitted	Luikart, Meredith Marie	02/10/2022 09:42 AM	Submitted for Approval
Approved	Barker, David John	02/10/2022 01:35 PM	Unit Approval
Approved	Osborne, Jeanne Marie	02/11/2022 01:41 PM	College Approval
Pending Approval	Cody, Emily Kathryn Jenkins, Mary Ellen Bigler Hanlin, Deborah Kay Hilty, Michael Vankeerbergen, Bernadette Chantal Steele, Rachel Lea	02/11/2022 01:41 PM	ASCCAO Approval

Digital Agriculture Laboratory Syllabus

AGSYSMT/HSC 3586 Spring 2023

Course Information

Course times and location: Labs will meet once a week Tuesday TBD

Credit hours: 1

Mode of delivery: In Person

Instructors

Department of Food, Agricultural and Biological Engineering:

Name: Dr. Scott A. Shearer

Email: shearer.95@osu.edu (preferred)

Phone: 614-292-7284

Office location: 590 Woody Hayes Drive

Office hours: please contact Bethany

Dickess (dickess.3@osu.edu) to set-up an appointment; use the course number (AGSYSMT 3585) in the subject line.

Department of Horticulture and Crop Science:

Name: Dr. David Barker

Office location: 226 Kottman Hall

E-mail: barker.169@osu.edu (preferred)

Phone: (614) 247-6258

Office Hours: TBD

Name: Dr. Guilherme Signorini

Office location: 225 Howlett Hall

E-mail: signorini.2@osu.edu (preferred)

Phone: no phone

Office Hours: TBD

Name: Dr. Alex Lindsey

Office location: 312A Kottman Hall

E-mail: lindsey.227@osu.edu (preferred)

Phone: (614) 292-3864

Office Hours: TBD

Course Coordinator

Department of Horticulture and Crop Science:

Name: Dr. Ramarao Venkatesh



THE OHIO STATE UNIVERSITY

College of Food, Agriculture, and Environmental Sciences
Horticulture and Crop Science:

301 Kottman Hall
 E-mail: lindsey.227@osu.edu (preferred)
 Phone: (614) 688-4204
 Office Hours: TBD

Preferred contact method: First contact with any instructor should be at Ohio State email address. Student will receive a response within **24 hours**.

Class-wide communications will be sent through the Announcements tool in CarmenCanvas. Please check your [notification preferences](https://go.osu.edu/canvas-notifications) (go.osu.edu/canvas-notifications) to be sure you receive these messages.

Course Prerequisites

AGSYSMT 2580, AGSYSMT 3585 or HCS 3585 (or concurrent)

Course Exclusions

None

Course Description

Digital Agriculture Laboratory provides an overview of the tools used for making management decisions based on data-driven processes in agriculture and food systems. The advancement of digital tools and analytics seeks to combine large data sets and sources with crop, animal, weather, environment, and capital asset management models, coupled with AI, to produce actionable information to enhance the profitability and sustainability of production agriculture. Simply stated, “digital agriculture” is the “generation and analysis of large data sets to produce actionable information.” This course seeks to provide experience working with large data sets using a variety of software tools for data analysis and visualization.

General Education Goals and Expected Learning

Outcomes

This 1-credit AGSYSMT/HCS 3586 laboratory supports ALL of the Goals and ALL Expected Learning Outcomes fulfilled by AGSYSMT/HCS 3585 for the Sustainability Theme category.

When 1-credit AGSYSMT/HCS 3586 is taken in combination with the 3-credit AGSYSMT/HCS 3585 lecture, together these 4-credits (i.e., 3-credit lecture + 1-credit laboratory) meet the expectations of the integrative, interdisciplinary, team-taught practice. The subject matter encompasses, biological, engineering, economic and social scales that are too broad or complex to be dealt with adequately by a single discipline or profession.

This course is taught by a multi-disciplinary team comprising of six faculty from two departments (Food, Agricultural and Biological Engineering, and Horticulture and Crop Science) in the College of Food, Agricultural, and Environmental Sciences (CFAES). Complex topics like managing global nitrogen cycle, climate change/extreme weather impacts, environmental

impact, food security/safety/traceability, sustainability, carbon sequestration, viability of rural communities (profit, labor), water quality and quantity issues, provide students opportunities to interact with each other, with instructors, and guest speakers.

Students will work with large scale complex problems throughout the entire course centered on food system operations (small holder vs corporate) that have an impact on the profitability, environment, sustainability, how technology impacts food, fuel, fiber, energy production practices, logistics, and careers (current and future). Students will have opportunities to revisit, analyze, and synthesize the material taught in the course. Students can compare their knowledge and understanding of the complex issues of data driven food, fuel, and fiber production systems and chart how their knowledge and understanding has changed across time. The content and procedures learned in this course will not only provide the basis for completing class assignments and activities but can be applied to future courses and employment.

Note: AGSYSMT/HCS 3586 (1 hr.) cannot be taken alone, nor fulfill GE credit without AGSYSMT/HCS 3585.

This laboratory course supports and reenforces AGSYSMT/HCS 3585's fulfillment of ALL of the Sustainability Theme Learning Goals and Expected Learning Outcomes.

- The laboratory supplies additional real-world application of the lecture topics.
- Data, data sets, analysis, and data visualization are core components of the lab reports.
- Students make informed decision using their academic/life experiences, data results, effects on sustainability and environment, and the impacts on humans (individuals, society/culture).

Laboratory Goals and Laboratory Learning Outcomes (LLO)

Lab Goal 1. Understand the evolution of principles, theories, and methods of data-driven agriculture effects on sustainability and society.

LLO 1.1 *Apply* the definitions, principles, theories, methods, history, and development of data driven agriculture.

LLO 1.2 *Evaluate* the use and role of different technologies in data driven agriculture and food systems that affect sustainability, environmental quality, and society.

Lab Goal 2. Gain experience with modern knowledge-based production technologies.

LLO 2.1 *Compare* the technologies used in data driven agriculture and food systems as they effect sustainability, environment, and society.

LLO 2.2 *Compare* the precision farming technologies used in intelligent networks and in data management.

LLO 2.3 *Make use of* geospatial technologies, intelligent networks, RFID, blockchain, data mining, applied IoT, and artificial intelligence used in data driven agriculture with the sustainability, and effects on the environment and society.



LLO 2.4. *Explain* On-Farm Research plot design and protocols that influence sustainability, environment, and society.

LLO 2.5 *Analyze* the automation of agricultural and livestock production, processing, and distribution systems with the sustainability, and effects on the environment and society.

Lab Goal 3. Understand data-driven insights, meaningful interpretation of results, and effective ways to visualize and communicate the outcomes to the sustainable management of agriculture inputs, to the workforce and society.

LLO 3.1 *Identify* data collection, data analysis, interpretation of results and effective communication of results to farmers/workforce and society that helps to plan their farm operations.

Lab Goal 4. Understand the economic and environmental benefits of data driven agriculture for the producer, consumer, and society.

LLO 4.1 *Examine* how data driven agriculture allows farmers to have economic and environmental benefits from their operations and the influence this has on society.

How This Course Works

Mode of delivery: In Person

Pace of 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 1 credit-hour multi-disciplinary team-taught laboratory course. According to [Ohio State bylaws on instruction](http://go.osu.edu/credit%20hours) (go.osu.edu/credit hours), students should expect around 1 hour per week of time spent on direct instruction (instructor content and Carmen activities, for example), an additional 1 hour of laboratory time, and in addition to 2 hours of laboratory and homework activities (reading and assignment preparation, for example) to receive a grade of C average.

Please note: This includes studying, reviewing, and editing notes, discussing with fellow students, etc. and does not equate to assignments and homework activities.

Attendance and participation requirements:

Research shows that regular participation is one of the highest predictors of success. With that in mind, the instructor has the following expectations for everyone's participation:

- **Attendance:** You are expected to attend all classes.
- **Participation:** Your participation in class is essential to your success. Participation includes Answering questions in class when called upon; sharing relevant insights of examples from your experiences; Asking questions if you do not understand the material



- In case of emergencies and other circumstances that prevent you from attending, please contact the instructor as soon as possible by email. Official documentation (e.g., from a doctor's office or hospital, or interviewer, etc.) must be provided. If you miss a lab session, please discuss how to make up the lab with the instructor in a different time.

Course Materials, Fees and Technologies

Required Materials and/or Technologies

- Precision Agriculture Basics. 2018. D. Kent Shannon, David E. Clay, and Newell R. Kitchen, (editors). Published by the American Society of Agronomy, Inc., Crop Science Society of America, Inc., Soil Science Society of America, Inc.
 - Purchase – [Precision Agriculture Basics](#). ISBN #: 978-0-89118-367-9 (online; doi:10.2134/precisionagbasics).
 - Library – The [Precision Agriculture Basics](#) link goes to the OSU Libraries. You must login with your OSU username and password if you are not logged in. To view the book, click on the “Connect to resource ACSESS Digital Library” link. Scroll down under the Table of Contents click on “DOWNLOAD FULL BOOK” or you can go to a specific chapter and download just that chapter.
- The instructor will provide you with supplementary reading materials periodically and will be announced during the lecture. They will be uploaded to Canvas.
- Computer: current Mac (OS X or PC (Windows 10 or higher 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

Recommended/Optional Materials and/or Technologies

- Crawley, M.J. 2013. The R Book. John Wiley and Sons, Ltd.: Chinster, West Sussex, United Kingdom. 2nd Ed. ISBN #: 9780470973929.
- Fischer, M.M., and A. Getis. 2010. Handbook of Applied Spatial Analysis; Software Tools, Methods and Applications. Springer-Verlag Berlin Heidelberg; ISBN #: 978-3-642-03646-0.
- Marshall, D.M., et al. 2011. Introduction to Unmanned Aircraft Systems. CRC Press, Boca Raton, FL. ISBN #: 1439835209.
- Price, M.H. 2016. Mastering ArcGIS. McGraw Hill Education: New York, New York. 7th Ed. ISBN #: 007809514X.

Fees and/or Additional Requirements

- None



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)

If you do not have access to the technology you need to succeed in this class, review options for technology and internet access at go.osu.edu/student-tech-access.

You can use any electronic device to access the course in CarmenCanvas and perform all of the function needed to complete the course. There may be additional directions or restrictions for some of the activities as noted in those activities.

Required Software

- **Microsoft Office 365:** All Ohio State University students are now eligible for free Microsoft Office 365 ProPlus through [Microsoft's Student Advantage program](#). Full instructions for downloading and installation is found [Office 365 - Installation of Office for Windows/Mac for Students](#).
- **Zotero:** You also need to install the ASABE style by going to [Zotero Style Repository](#) then select [American Society of Agricultural and Biological Engineers](#) or, [ZoteroBib](#) to build bibliography without downloading the app and style. Instructions are found [ZoteroBib FAQ](#).
- **ArcGIS Desktop:** Will be used in the labs and you need to download it to a Windows machine from go.osu.edu/esri. [Go to the ArcGIS Desktop Get started with](#) ArcMap and follow the instructions.
- "R"- **What is R?** You will be using R in lab for statics. You can download R for free from the [R Project for Statistical Computing](#) using a USA CRAN server such as [Case Western Reserve University Mirror](#). There are downloads for Linux, macOS and Windows.

CarmenCanvas 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 do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the [BuckeyePass - Adding a Device](#) (go.osu.edu/add-device help article for step-by-step instructions.
- 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.
- [Install the Duo Mobile application](#) (go.osu.edu/install-duo) on 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](tel:614-688-4357) ([HELP](#) and IT support staff will work out a solution with you).

Technology Skills Needed for This Course

- Basic computer and web-browsing skills
- [Navigating CarmenCanvas](https://go.osu.edu/canvasstudent) (go.osu.edu/canvasstudent)
- [CarmenZoom virtual meetings](https://go.osu.edu/zoom-meetings) (go.osu.edu/zoom-meetings)
- [Recording a slide presentation with audio narration and recording, editing and uploading video](https://go.osu.edu/video-assignment-guide) (go.osu.edu/video-assignment-guide)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat:** go.osu.edu/it
- **Phone:** [614-688-4357](tel:614-688-4357) ([HELP](#))
- **Email:** servicedesk@osu.edu

Grading and Faculty Response

Assignment Category	Percentage
Lab Reports (14)	100%
Total	100%

Descriptions of Laboratory Course Assignments

Description: There are 14 Laboratory Report each with a procedure, objectives, data, and results. There is a rubric for each Laboratory Report. **See page 10 for the Late Assignments.**

Goal 1 [CLO 1.1 (ELO 3.1, 3.2, 3.3); CLO 1.2 (ELO 1.1, 1.2, 2.1, 3.2)]

Goal 2 [CLO 2.1 (ELO 1.1, 2.1, 3.1, 3.2, 3.3); CLO 2.2 (ELO 1.1); CLO 2.3 (ELO 2.1, 3.2, 3.3); CLO 2.4 (ELO 1.2, 2.1); CLO 2.5 (ELO 1.2, 2.1, 3.1, 3.2, 3.3); CLO 2.6 (ELO 1.2, 3.2, 3.3, 3.3)]

Goal 3 [CLO 3.1 (ELO 1.1, 2.1, 3.1, 3.2, 3.3)]

Goal 4 [CLO 4.1 (ELO 1.2, 2.1, 3.1, 3.2, 3.3)]

Grading Rubric for Laboratory Reports



General Laboratory Report Rubric	
Grading Scale 4-point scale – 4 (exceeds expectations - >90%, 3 (meets expectations - 80-90%, 2 (meets $\frac{2}{3}$ of the expectations 70-80%, 1 (meets $\frac{1}{3}$ of the expectations - 60-70%, and 0 (unsatisfactory - <60%	Score
Report Requirements	0 to 4 pts.
A. Write out the objective of the report, do not include any irrelevant details	
B. Demonstrate thorough understanding of topic using complete and accurate information	
C. Present information in a knowledgeable manner	
D. Use three or more referenced resources to gather information including speaking with stakeholders and experts	
E. Use appropriate resources (peer reviewed publications, trade publications, websites, videos etc. using the ASABE Style Guide	
Subtotal	
Report Organization	0 to 4 pts.
1. Visual appeal and clarity, figures and maps are neatly done with proper labeling	
2. Legible, neatness, and creativity	
3. Homework is complete and on time	
4. Successfully meet the objective(s) of the assignment	
5. Written assignment without any typos and clearly written	
Subtotal	
Total (0 to 40 pts.)	

Students will have 14 laboratory reports to complete. Be sure you understand the specifics of the report and respond accordingly. Laboratory reports will count for **100% of your final grade**. A total of 14 reports will be given during the entire duration of the course.

We are training you to become professionals. With this in mind, your work should be of high quality. Your laboratory assignments should be organized and meet the requirements mentioned in the “general” rubric above. But, for each laboratory assignment we will provide you with a specific rubric relevant to the assigned homework assignment. Partial credit will be given.

Grading Scale

Grade	Range
A	100 % to 93.0%
A-	< 93.0 % to 90.0%
B+	< 90.0 % to 87.0%
B	< 87.0 % to 83.0%
B-	< 83.0 % to 80.0%
C+	< 80.0 % to 77.0%
C	< 77.0 % to 73.0%
C-	< 73.0 % to 70.0%
D+	< 70.0 % to 67.0%
D	< 67.0 % to 60.0%
E	< 60.0 % to 0.0%



Academic integrity and collaboration:

Your laboratory reports should be your own original work. In formal reports, you should follow ASABE style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in but no one else should revise or rewrite your work.

Reusing Past Work

In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you have explored in previous courses, please discuss the situation with me.

Falsifying Research or Results

All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.

Collaboration and Informal Peer-Review

The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on a quiz or assignment is not permitted. If you are unsure about a particular situation, please feel free just to ask ahead of time.

Late Assignments

Please refer to Carmen for due dates. Due dates are set to help you stay on pace and to allow timely feedback that will help you complete subsequent assignments.

- Late work will have 20% of the total points deleted for each day it is late. Five (5) days late you will receive zero (0 points). This is based on the timestamp in Carmen, anything after the deadline is the next day and 20% off. In the case of documented emergency or illness, please contact the Course Coordinator as soon as possible to discuss accommodations, which will be determined on a case-by-case basis.

Instructor Feedback and Response Time

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.

- **Preferred contact method:** If you have a question, please contact me first through my Ohio State email address. I will reply to emails within **24 hours on days when class is in session at the university.**



- 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-HELP** at any time if you have a technical problem.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check [your notification preferences](https://go.osu.edu/canvas-notifications) (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Discussion board:** I will check and reply to messages in the discussion boards once mid-week and once at the end of the week.
- **Grading and feedback:**
 - For large weekly assignments, you can generally expect feedback within 7 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. I will provide specific guidance for discussions on controversial or personal topics.
- **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.
- **Synchronous sessions:** During our Zoom sessions I ask you to use your real name and a clear photo of your face in your Carmen profile. During our full-group lecture time, you may turn your camera off if you choose. When in breakout rooms or other small-group discussions, having cameras and mics on as often as possible will help you get the most out of activities. You are always welcome to use the [free, Ohio State-themed virtual backgrounds](https://go.osu.edu/zoom-backgrounds) (go.osu.edu/zoom-backgrounds). Remember that Zoom and the Zoom chat are our classroom space where respectful interactions are expected.]



Academic Integrity Policy

See [Descriptions of Major Course Assignments](#) for specific guidelines about collaboration and academic integrity in the context of this online class.

Ohio State's Academic Integrity Policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's [Code of Student Conduct](#) (studentconduct.osu.edu), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration, copying the work of another student, and possession of unauthorized materials during an examination). Ignorance of the university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

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](http://go.osu.edu/coam) (go.osu.edu/coam)
- [Ten Suggestions for Preserving Academic Integrity](http://go.osu.edu/ten-suggestions) (go.osu.edu/ten-suggestions)
- [Eight Cardinal Rules of Academic Integrity](http://go.osu.edu/cardinal-rules) (go.osu.edu/cardinal-rules)

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.

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom, race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

1. Online reporting form at equity.osu.edu,
2. Call 614-247-5838 or TTY 614-688-8605,
3. Or email equity@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

Counseling and Consultation Services/Mental Health

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 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 mental health resources](https://go.osu.edu/ccsondemand) (go.osu.edu/ccsondemand) are available. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614- 292-5766. **24-hour emergency help** is available through the 24/7 [National Suicide Prevention Lifeline website](https://www.suicidalifeline.org/)



(suicidepreventionlifeline.org) or by calling [1-800-273-8255\(TALK\)](tel:1-800-273-8255). [The Ohio State Wellness app \(go.osu.edu/wellnessapp\)](http://go.osu.edu/wellnessapp) is also a great resource.

David Wirt, wirt.9@osu.edu, is the CFAES embedded mental health counselor. He is available for new consultations and to establish routine care. To schedule with David, please call 614-292-5766. Students should mention their affiliation with CFAES when setting up a phone screening.

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 \(SLDS\)](#). After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services.

Disability Services Contact Information

- Phone: [614-292-3307](tel:614-292-3307)
- Website: slds.osu.edu
- Email: slds@osu.edu
- In person: [Baker Hall 098, 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 as early as possible.

- [CarmenCanvas accessibility \(go.osu.edu/canvas-accessibility\)](http://go.osu.edu/canvas-accessibility)
- Streaming audio and video
- [CarmenZoom accessibility \(go.osu.edu/zoom-accessibility\)](http://go.osu.edu/zoom-accessibility)
- Overview of Accessibility at OSU [OSU Privacy](#)

Specific course software's accessibility privacy statements

Vendor Accessibility

[\(ArcGIS Desktop\) ArcMap](#)
[Carmen \(Canvas accessibility\)](#)
[CarmenZoom accessibility](#)
[MediaSite Accessibility Statement](#)
[Microsoft Office Accessibility](#)

Vendor Privacy

[ArcGIS Privacy](#)
[Carmen \(Canvas/Infrastructure Privacy\)](#)
[CarmenZoom Privacy](#)
[MediaSite Privacy](#)
[Microsoft Office 365 Privacy](#)



Course Schedule

Lab/ Week No.	Due Date	Tentative Laboratory Title, Readings	LLO
1		Data Precision, Accuracy and Outliers	LG1 LLO 1.1 LG1 LLO 1.2
2		ArcGIS for mapping, analysis, and modelling.	LG2 LLO 2.3
3		Variable Rate Technology	LG1 LLO 1.2 LG2 LLO 2.2 LG3 LLO 3.1
4		Yield Monitor Data: Cleaning and Processing	LG1 LLO 1.2 LG2 LLO 2.3 LG3 LLO 3.1
5		Agricultural Machinery Data Collection, Decoding, and Processing	LG1 LLO 1.2 LG2 LLO 2.2 LG3 LLO 3.1 LG4 LLO 4.1
6		Farm Data Interoperability	LG1 LLO 1.2 LG2 LLO 2.1 LG2 LLO 2.2
7		Application of Google Earth in Digital Agriculture	LG1 LLO 1.2 LG2 LLO 2.3
8		Remote Sensing and its application in Digital Agriculture	LG1 LLO 1.2 LG2 LLO 2.3
9		Drones and their application in Digital Agriculture	LG1 LLO 1.2 LG2 LLO 2.2 LG2 LLO 2.3 LG3 LLO 3.1
10		Spring Break	
11		Mapping, Data Analytics, and Modeling using ArcGIS	LG1 LLO 1.2 LG2 LLO 2.2 LG2 LLO 2.5 LG3 LLO 3.1 LG4 LLO 4.1
12		Introduction to R programming language and its application for on-farm research data analysis.	LG1 LLO 1.2 LG2 LLO 2.2 LG2 LLO 2.5 LG3 LLO 3.1 LG4 LLO 4.1
13		Data Mining and Application of Big Data in Digital Agriculture	LG1 LLO 1.2 LG3 LLO 3.1
14		Supply Chain Management in Digital Agriculture	LG1 LLO 1.2 LG2 LLO 2.4 LG4 LLO 4.1
15		Application of Blockchain and Cryptocurrencies in Digital Agriculture	LG1 LLO 1.2 LG2 LLO 2.3



GE THEME COURSES

Overview

Courses that are accepted into the General Education (GE) Themes must meet two sets of Expected Learning Outcomes (ELOs): those common for all GE Themes and one set specific to the content of the Theme. This form begins with the criteria common to all themes and has expandable sections relating to each specific theme.

A course may be accepted into more than one Theme if the ELOs for each theme are met. Courses seeking approval for multiple Themes will complete a submission document for each theme. Courses seeking approval as a 4-credit, Integrative Practices course need to complete a similar submission form for the chosen practice. It may be helpful to consult your Director of Undergraduate Studies or appropriate support staff person as you develop and submit your course.

Please enter text in the boxes to describe how your class will meet the ELOs of the Theme to which it applies. Please use language that is clear and concise and that colleagues outside of your discipline will be able to follow. You are encouraged to refer specifically to the syllabus submitted for the course, since the reviewers will also have that document. Because this document will be used in the course review and approval process, you should be as specific as possible, listing concrete activities, specific theories, names of scholars, titles of textbooks etc.

Course subject & number

General Expectations of All Themes

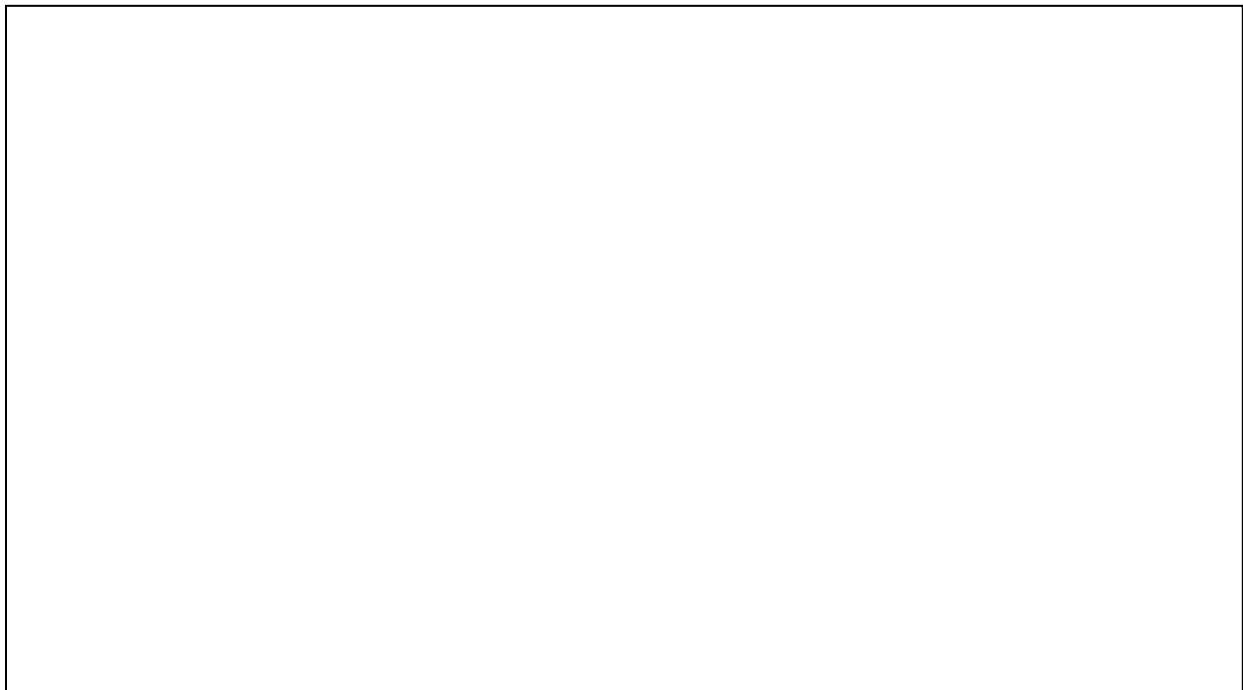
GOAL 1: Successful students will analyze an important topic or idea at a more advanced and in-depth level than the foundations.

Please briefly identify the ways in which this course represents an advanced study of the focal theme. In this context, “advanced” refers to courses that are e.g., synthetic, rely on research or cutting-edge findings, or deeply engage with the subject matter, among other possibilities. *(50-500 words)*

Course subject & number

ELO 1.1 Engage in critical and logical thinking about the topic or idea of the theme. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

ELO 1.2 Engage in an advanced, in-depth, scholarly exploration of the topic or idea of the theme. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

A large, empty rectangular box with a thin black border, intended for the student to write their response to the ELOs. The box is currently blank.

Course subject & number

GOAL 2: Successful students will integrate approaches to the theme by making connections to out-of-classroom experiences with academic knowledge or across disciplines and/or to work they have done in previous classes and that they anticipate doing in future.

ELO 2.1 Identify, describe, and synthesize approaches or experiences as they apply to the theme.

Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

ELO 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.

Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course subject & number

Specific Expectations of Courses in Sustainability

GOAL 1: Students analyze and explain how social and natural systems function, interact, and evolve over time; how human wellbeing depends on these interactions; how actions have impacts on subsequent generations and societies globally; and how human values, behaviors, and institutions impact multi-faceted, potential solutions across time.

1.1 Describe elements of the fundamental dependence of humans on Earth and environmental systems and on the resilience of these systems. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course subject & number

1.2 Describe, analyze and critique the roles and impacts of human activity and technology on both human society and the natural world, in the past, currently, and in the future. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

1.3 Devise informed and meaningful responses to problems and arguments in the area of sustainability based on the interpretation of appropriate evidence and an explicit statement of values. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)