
Term Information

Effective Term Autumn 2023

General Information

Course Bulletin Listing/Subject Area Earth Sciences
Fiscal Unit/Academic Org School of Earth Sciences - D0656
College/Academic Group Arts and Sciences
Level/Career Graduate, Undergraduate
Course Number/Catalog 5656
Course Title Ecohydrology in a Changing Climate
Transcript Abbreviation Ecohydrology
Course Description Physical and ecological processes of plant-water interactions in natural ecosystems. Principles of water transport in the soil-plant system, plant drought response, and feedbacks of plants of plants to the climate through changing energy-water-carbon cycles. Exploration of ecohydrological datasets from ground and remote sensing measurements and physically based models.
Semester Credit Hours/Units Fixed: 3

Offering Information

Length Of Course 14 Week, 12 Week, 8 Week, 7 Week, 6 Week, 4 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 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 Math 1141 or 1151 above; and Physics 1250 or above; or graduate standing; or permission of instructor.
Exclusions
Electronically Enforced Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code 40.0601
Subsidy Level Doctoral Course
Intended Rank Junior, Senior, Masters, Doctoral

Requirement/Elective Designation

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

- Outline principles governing water transport through the soil-plant-atmosphere system
- Identify key roles of vegetation on water and carbon cycles in the context of climate change
- Apply basic physically based models to describe plant responses to drought
- Interpret ecohydrological observations from a tree to regional and global scales and create case studies

Content Topic List

- Overview on ecohydrology
 - Quantitative description of ecosystems
 - Fundamentals on energy and mass transfer
 - Probability and time series basics
 - Surface energy fluxes and evapotranspiration
 - Soil moisture and drought in a changing climate
- Root zone water balance
 - Plant hydraulics
 - Stomatal conductance in land surface models
 - Plant response to current and future water stresses
 - Plant water use efficiency
 - Ecosystem carbon budgets
- Vegetation resilience under climate change and disturbance
 - Overview on remote sensing of ecohydrology

Sought Concurrence

Yes

Attachments

- CURRICULAR MAP OF COURSES AVAILABLE IN EARTH SCIENCES B.docx: updated curriculum map with course highlighted
(Other Supporting Documentation. Owner: Griffith,Elizabeth M)
- Concurrence from EEOB.pdf: concurrence--EEOB
(Concurrence. Owner: Vankeerbergen,Bernadette Chantal)
- Concurrence from SENR - EARTHSC5656Ecohydrology.pdf: concurrence--ENR
(Concurrence. Owner: Vankeerbergen,Bernadette Chantal)
- Syllabus_Ecohydrology_SP22_v2.docx: revised syllabus 2023
(Syllabus. Owner: Griffith,Elizabeth M)
- Concurrence from Horticulture and Crop Science.pdf: concurrence-Hort&CropSci
(Concurrence. Owner: Griffith,Elizabeth M)
- Concurrence from Molecular Genetics.pdf: concurrence-MolecularGenetics
(Concurrence. Owner: Griffith,Elizabeth M)
- reponse to panel March 2023.pdf: response to panel
(Other Supporting Documentation. Owner: Griffith,Elizabeth M)

Comments

- Thanks. We have addressed panel feedback, and updated the documents. *(by Griffith,Elizabeth M on 03/20/2023 01:42 PM)*
- See Panel feedback email sent 10/28/2021 RLS *(by Steele,Rachel Lea on 10/28/2021 10:25 AM)*
- If course can count in your major(s) even as an elective, please provide updated curriculum map. *(by Vankeerbergen,Bernadette Chantal on 09/08/2021 03:23 PM)*

Workflow Information

| Status | User(s) | Date/Time | Step |
|--------------------|---|---------------------|------------------------|
| Submitted | Griffith,Elizabeth M | 08/30/2021 08:03 PM | Submitted for Approval |
| Approved | Griffith,Elizabeth M | 08/30/2021 08:05 PM | Unit Approval |
| Revision Requested | Vankeerbergen,Bernadette Chantal | 09/08/2021 03:23 PM | College Approval |
| Submitted | Griffith,Elizabeth M | 09/08/2021 05:03 PM | Submitted for Approval |
| Approved | Griffith,Elizabeth M | 09/08/2021 05:03 PM | Unit Approval |
| Approved | Vankeerbergen,Bernadette Chantal | 10/19/2021 12:39 PM | College Approval |
| Revision Requested | Steele,Rachel Lea | 10/28/2021 10:25 AM | ASCCAO Approval |
| Submitted | Griffith,Elizabeth M | 03/20/2023 01:43 PM | Submitted for Approval |
| Approved | Griffith,Elizabeth M | 03/20/2023 01:43 PM | Unit Approval |
| Approved | Vankeerbergen,Bernadette Chantal | 03/21/2023 11:05 PM | College Approval |
| Pending Approval | Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Hilty,Michael Vankeerbergen,Bernadette Chantal Steele,Rachel Lea | 03/21/2023 11:05 PM | ASCCAO Approval |

Please find our responses and updated documents submitted for EARTHSC 5656 as a new course. We hope that this course can be considered for approval and possible inclusion in the Autumn 2023 course offerings. Sincerely, Liz Griffith

Good morning,

On Wednesday, October 27th, 2021, the Natural and Mathematical Sciences Panel of the ASC Curriculum Committee reviewed a new course proposal for Earth Sciences 5656.

The Panel did not vote on the proposal as they would like the following points addressed:

- The Panel requests that the Earth Sciences department obtain concurrences from the department of Horticulture and Crop Science and the department of Molecular Genetics for this course.

See documented concurrence from both departments (granted Spring 2023 with revised syllabus).

- The Panel asks that the department provide more information on the syllabus regarding the group project so that students better understand what will be expected of them. Relevant details could include (but are not limited to) the expected length of the presentation, length/word count requirements for any written component, clarification on expectations for visual aids (poster, Power Point etc.,) and/or a mention of how the project will be evaluated (rubric, peer or self-evaluations, etc.)

See revised syllabus. Additional details for group project are provided.

- The Panel requests that the department amend the syllabus (pg. 1) to eliminate the cross-listing of the course in SENR

See revised syllabus and removal of cross-listing for SENR.

I will return Earth Sciences 5656 to the department queue via curriculum.osu.edu in order to address the Panel's requests.

Should you have any questions about the feedback of the Panel, please feel free to contact Wendy Panero (faculty Chair of the NMS Panel; cc'd on this e-mail), or me.

Best,

Rachel

Ecohydrology in a Changing Climate

[EARTHSC 5656] [Fall 2023]

Course Information

- **Course times and location:** Monday/Wednesday 2:20-3:40 pm, Mendenhall Lab 252
- **Credit hours:** 3
- **Mode of delivery:** Two lectures per week (in person)

Instructor

- **Name:** Yanlan Liu
- **Email:** liu.9367@osu.edu
- **Office location:** Room 223, Mendenhall Laboratory Bldg.
- **Office hours:** Monday 3:40-4:30 pm

Course Prerequisites

Math 1141 or above; and Physics 1250 or above; or graduate standing; or permission of instructor.

Course Description

This course is about physical and ecological processes of plant-water interactions in natural ecosystems. We will cover the principles of water transport in the soil-plant system, plant drought response, and feedbacks of plants to the climate through changing energy-water-carbon cycles. Students will analyze ecohydrological datasets from ground and remote sensing measurements and apply physically based models to analyze plant-mediated land surface processes in the context of climate change.

Learning Outcomes

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

- Outline principles governing water transport through the soil-plant-atmosphere system
- Identify key pathways that plants regulate energy-water-carbon cycles under climate change
- Apply basic physically based models to describe plant responses to drought
- Interpret ecohydrological observations from a tree to regional and global scales and create case studies



Course Materials

Required Materials

- Bonan, G. (2019). *Climate change and terrestrial ecosystem modeling*. Cambridge University Press. [open online access]
- Review articles [all available online through university library]
 - Guswa et al. (2020). Advancing ecohydrology in the 21st century: A convergence of opportunities. *Ecohydrology*, 13(4), e2208.
 - D'Odorico et al. (2010). Ecohydrology of terrestrial ecosystems. *BioScience*, 60(11), 898-907.
 - Brodrribb et al. (2020). Hanging by a thread? Forests and drought. *Science*, 368(6488), 261-266.
 - McDowell et al. (2019). Hydraulics in the 21st century. *New Phytologist*, 224(2), 537-542.
 - Fatichi et al. (2016). Modeling plant–water interactions: an ecohydrological overview from the cell to the global scale. *Wiley Interdisciplinary Reviews: Water*, 3(3), 327-368.
 - Konings, et al. (2021). Detecting forest response to droughts with global observations of vegetation water content. *Global change biology*, 27(23), 6005-6024.

Recommended Materials

- Chapin III, F. S., Matson, P. A., & Vitousek, P. (2011). *Principles of terrestrial ecosystem ecology*. Springer Science & Business Media. [open online access]
- Campbell, G. S., & Norman, J. (2012). *An introduction to environmental biophysics*. Springer Science & Business Media.
- Rodríguez-Iturbe, I., & Porporato, A. (2007). *Ecohydrology of water-controlled ecosystems: soil moisture and plant dynamics*. Cambridge University Press.
- Additional journal articles to be listed



Grading

| Assignment Category | Points |
|---------------------|--------|
| Written Assignments | 40% |
| In class quizzes | 20% |
| Group project | 35% |
| Participation | 5% |

Descriptions of Major Course Assignments

Written Assignments

There will be eight short written assignments (2-3 problems each), including conceptual questions and calculations, and coding exercises. Coding experiences using any programming language, e.g., Python, R, Matlab, C, would be preferred. However, for students who had limited coding experience, we will offer one session in the second week going through the basics of Python. Materials on other preferred languages will be provided. Assignments will be due on Tuesday and graded by Thursday in the same week. Students have one chance to redo the assignments marked as incorrect and resubmit by the next Tuesday.

In-class quizzes

There will be two in-class quizzes (15 mins each) focusing on conceptual questions.

Group project

Students will form self-organizing teams, each with 1-4 people. Each team will identify their project topic with the help of the instructor and submit a 1-page project proposal before the fall break. Final presentations will be held in the last week of class. Each presentation will be 8 minutes using PowerPoint, plus 2 minutes for questions. After the presentation and by the end of the final week, each team will submit a project report no longer than 4 pages (excluding references), which describes the project background, objectives or science questions, methods, main results, and implications. The report should state the contribution of each team member. The group project will be evaluated based on the scientific merit, clarity on identifying motivation, the validity of methods, whether the results are rigorously supported, presentation and writing clarity, and each team member's contribution.

Grading Scale

93–100: A 90–92.9: A- 87–89.9: B+ 83–86.9: B 80–82.9: B-
 77–79.9: C+ 73–76.9: C 70–72.9: C- 67–69.9: D+ 60–66.9: D
 Below 60: E



Course Schedule

| Week | Lecture Topics | Assignments | Readings |
|------|--|--------------------|--|
| 1 | Overview on ecohydrology | | D'Odorico et al. (2010) Guswa et al. (2020) |
| 2 | Quantitative description of ecosystems | Assignment 1 | Bonan, Chapter 2: Ecosystem Structure |
| 3 | Fundamentals on energy and mass transfer | Assignment 2 | Bonan, Chapter 3: Fundamentals of Energy and Mass Transfer |
| 4 | Probability and time series basics | Assignment 3 | |
| 5 | Surface energy fluxes and evapotranspiration | Assignment 4 | Bonan, Chapter 7: Surface Energy Fluxes |
| 6 | Soil moisture and drought in a changing climate | Assignment 5 | Bonan, Chapter 8: Soil Moisture Brodribb et al. (2020) |
| 7 | Root zone water balance | In-class quiz 1 | |
| 8 | Plant hydraulics | Assignment 6 | Bonan, Chapter 13: Plant Hydraulics. McDowell et al. (2019) |
| 9 | Stomatal conductance in land surface models | Project proposal | Bonan, Chapter 12: Stomatal Conductance |
| 10 | Fall break | | |
| 11 | Plant response to current and future water stresses | Assignment 7 | Bonan, Chapter 11: Leaf photosynthesis Konings et al. (2021) |
| 12 | Plant water use efficiency | Assignment 8 | Bonan, Chapter 15: Plant Canopies |
| 13 | Ecosystem carbon budgets | In-class quiz 2 | |
| 14 | Vegetation resilience under climate change and disturbance | | Bonan, Chapter 1: Terrestrial Biosphere Models; Fatichi et al. (2016). |
| 15 | Overview on remote sensing of ecohydrology | Final presentation | |



Other Course Policies

Statement on academic misconduct

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 <https://studentconduct.osu.edu/>

Statement on disability services

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; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Statement on 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. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life’s Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling [614-292-5766](tel:614-292-5766). 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](tel:614-292-5766) and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org.

Statement on sexual misconduct/relationship violence

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



Statement on diversity and inclusion

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.



Re: Concurrence Request EARTHSC 5656 Ecohydrology

Hamilton, Ian <hamilton.598@osu.edu>

Fri 9/24/2021 12:49 PM

To: Lower, Steven <lower.9@osu.edu>; Griffith, Elizabeth M. <griffith.906@osu.edu>

Dear Liz,

EEOB offers concurrence on the proposed offering of EARTHSC 5656. The proposed course does not have substantial overlap with our offerings. I expect that some EEOB undergraduate and graduate students will be interested in taking this class.

Best regards,
Ian



THE OHIO STATE UNIVERSITY

Ian Hamilton

Professor

Vice Chair of Undergraduate Studies, EEOB

[College of Arts & Sciences](#)

Department of Evolution, Ecology and Organismal Biology & Department of Mathematics

390 Aronoff Laboratory, 318 W 12th Ave, Columbus, OH 43210

hamilton.598@osu.edu

Pronouns: he/him/his

From: Freudenstein, John <freudenstein.1@osu.edu>

Sent: Wednesday, September 15, 2021 9:47 AM

To: Hamilton, Ian <hamilton.598@osu.edu>

Subject: FW: Concurrence Request EARTHSC 5656 Ecohydrology

Ian:

A concurrence request.

Thanks, John

From: Lower, Steven <lower.9@osu.edu>

Sent: Tuesday, September 14, 2021 11:24 AM

To: Griffith, Elizabeth M. <griffith.906@osu.edu>

Cc: Freudenstein, John <freudenstein.1@osu.edu>

Subject: Fw: Concurrence Request EARTHSC 5656 Ecohydrology

Brian begins as Chair next year. John Freudenstein is still steering the ship in EEOB

From: Griffith, Elizabeth M. <griffith.906@osu.edu>

Sent: Tuesday, September 14, 2021 11:02 AM

To: Carstens, Bryan C. <carstens.12@osu.edu>

Cc: Lower, Steven <lower.9@osu.edu>

Subject: Concurrence Request EARTHSC 5656 Ecohydrology

Dear Prof Bryan Carstens (Chair EEOB),

Please find attached a proposal for a new EARTHSC course (cross-listed with ENR) on ecohydrology to be taught by our new Assistant Professor Yanlan Liu in Spring 2022. The syllabus is attached. Our School of Earth Sciences is seeking concurrence for the new course (a response to be uploaded with the proposal for the panel review). After discussions with Bernadette Vankeerberghen (Assistant Dean, Curriculum, CAS), we thought it would be a good idea to seek concurrence from EEOB for this new course to add to our proposal for consideration.

Please email your responses/concurrences to me (griffith.906@osu.edu) and our chair also copied to this email, lower.9@osu.edu. *Responses are due by **Tuesday, September 28, 2021***. Concurrence will be assumed if no response is received within two weeks.

Regards,

Liz

Associate Professor & Associate Director of Administration
School of Earth Sciences

Re: new cross-listed course in Spring 2022

Griffith, Elizabeth M. <griffith.906@osu.edu>

Mon 10/11/2021 2:12 PM

To: Brooks, Jeremy S. <brooks.719@osu.edu>; Sharp, Jeff <sharp.123@osu.edu>

Cc: Lower, Steven <lower.9@osu.edu>; Johnston, Renee <johnston.230@osu.edu>

Thanks for considering the request and I am happy to proceed without cross-listing and will use your email as concurrence from SENR. No need for a formal document/signature.

Sincerely,

Liz

From: Brooks, Jeremy S. <brooks.719@osu.edu>

Sent: Monday, October 11, 2021 1:20 PM

To: Sharp, Jeff <sharp.123@osu.edu>; Griffith, Elizabeth M. <griffith.906@osu.edu>

Cc: Lower, Steven <lower.9@osu.edu>; Johnston, Renee <johnston.230@osu.edu>

Subject: Re: new cross-listed course in Spring 2022

Hi Elizabeth,

We've had some extensive conversations about Ecohydrology and it seems like the easiest way forward – and the quickest way for SES to get this course on the books by Spring is to remove the need for cross-listing with SENR. From our perspective, it doesn't seem necessary.

Instead, I think we can treat this as a concurrence request and with Rachel Gabor and Steve Lyon reviewing the course and speaking with Yanlan, there are no problems from our end.

So, if you are able to accept this email as providing concurrence, from SENR's perspective, there's no problem proceeding. If you need an official concurrence form signed, I'd be happy to do that as well.

Apologies for the delay – and please let us know if you think there's a need to keep the course cross-listed.

Best
Jeremy



THE OHIO STATE UNIVERSITY

Jeremy Brooks

Associate Professor

College of Food, Agricultural, and Environmental Sciences

School of Environment and Natural Resources

469D Kottman Hall, 2021 Coffey Rd, Columbus, OH 43212

614-292-9787 Office

brooks.719@osu.edu / <https://u.osu.edu/brooks.719/>

Buckeyes consider the environment before printing.

From: Sharp, Jeff <sharp.123@osu.edu>

Date: Tuesday, September 21, 2021 at 9:56 AM

FW: Concurrence Request EARTHSC 5656 Ecohydrology in a Changing Climate

Karcher, Doug <karcher.3@osu.edu>
Mon 3/6/2023 9:25 PM
To: Griffith, Elizabeth M. <griffith.906@osu.edu>
Hi Liz,

HCS is happy to grant concurrence for your EARTHSC 5656 course. I hope that it is a big success.

Kind regards,
Doug



Doug Karcher, Ph.D.
Professor & Chair
Horticulture and Crop Science
(479) 263-1293

From: Lindsey, Alexander J. <lindsey.227@osu.edu>
Sent: Monday, March 6, 2023 8:41 AM
To: Karcher, Doug <karcher.3@osu.edu>
Cc: Barker, David <barker.169@osu.edu>
Subject: RE: Concurrence Request EARTHSC 5656 Ecohydrology in a Changing Climate

Dear Dr. Karcher,

I sent this out for review by Academic Affairs, and the committee noticed there would be some overlap with plant water concepts similar to what is presented in our HCS 3310 and HCS 5621 courses, though this overlap would only be 20-25%. The proposed course also delves more into the predictive/analytical tools to quantify its movement. As such, we recommend granting concurrence. It may be of interest to our students, though the Physics prerequisite may cause some issues with our students enrolling.

Thanks,

Alex

From: Karcher, Doug <karcher.3@osu.edu>
Sent: Wednesday, March 1, 2023 10:58 PM
To: Griffith, Elizabeth M. <griffith.906@osu.edu>; Barker, David <barker.169@osu.edu>; Vaessin, Harald <vaessin.1@osu.edu>; Lindsey, Alexander J. <lindsey.227@osu.edu>
Cc: Lower, Steven <lower.9@osu.edu>
Subject: RE: Concurrence Request EARTHSC 5656 Ecohydrology in a Changing Climate

Thank you. We'll take a look and get a response to you by 3/15.

Kind regards,
doug



Doug Karcher, Ph.D.
Professor & Chair
Horticulture and Crop Science
(479) 263-1293

From: Griffith, Elizabeth M. <griffith.906@osu.edu>
Sent: Wednesday, March 1, 2023 5:45 AM
To: Barker, David <barker.169@osu.edu>; Karcher, Doug <karcher.3@osu.edu>; Vaessin, Harald <vaessin.1@osu.edu>
Cc: Lower, Steven <lower.9@osu.edu>
Subject: Concurrence Request EARTHSC 5656 Ecohydrology in a Changing Climate

To whom it may concern,

Our School of Earth Sciences is seeking concurrence with your units for the proposed course **EARTHSC 5656 Ecohydrology in a Changing Climate** (revised syllabus attached) as there were concerns in the first ASC Curriculum Committee review about overlap between this proposed class and classes in Horticulture and Crop Science and Molecular Genetics. We feel that the focus on modeling and the interactions between plants and climate make this a unique course.

Please email your responses/concurrences to me (griffith.906@osu.edu) and our chair copied to this email, lower.9@osu.edu. Responses are due by **Wednesday, March 15, 2023**. Concurrence will be assumed if no response is received within two weeks.

Regards,
Liz Griffith
Associate Professor & Associate Director of Administration
School of Earth Sciences Chair of Curriculum Committee

Re: Concurrence Request EARTHSC 5656 Ecohydrology in a Changing Climate

Vaessin, Harald <vaessin.1@osu.edu>

Wed 3/1/2023 8:35 AM

To: Griffith, Elizabeth M. <griffith.906@osu.edu>

Liz,

Molecular Genetics has no concerns at all and is happy to provide concurrence for EARTHSC5656.

Best wishes,

Harald

Dr. Harald Vaessin

Chair, Professor

Department of Molecular Genetics

972 Biological Sciences Bldg | 484 W. 12th Avenue, Columbus, OH 43210-1292

614-292-3594 Office | 614-361-6456 Mobile | 614-292-4466 Fax

vaessin.1@osu.edu

From: Griffith, Elizabeth M. <griffith.906@osu.edu>

Sent: Wednesday, March 1, 2023 5:44 AM

To: Barker, David <barker.169@osu.edu>; Karcher, Doug <karcher.3@osu.edu>; Vaessin, Harald <vaessin.1@osu.edu>

Cc: Lower, Steven <lower.9@osu.edu>

Subject: Concurrence Request EARTHSC 5656 Ecohydrology in a Changing Climate

To whom it may concern,

Our School of Earth Sciences is seeking concurrence with your units for the proposed course **EARTHSC 5656 Ecohydrology in a Changing Climate** (revised syllabus attached) as there were concerns in the first ASC Curriculum Committee review about overlap between this proposed class and classes in Horticulture and Crop Science and Molecular Genetics. We feel that the focus on modeling and the interactions between plants and climate make this a unique course.

Please email your responses/concurrences to me (griffith.906@osu.edu) and our chair copied to this email, lower.9@osu.edu. Responses are due by **Wednesday, March 15, 2023**. Concurrence will be assumed if no response is received within two weeks.

Regards,

Liz Griffith

Associate Professor & Associate Director of Administration

School of Earth Sciences Chair of Curriculum Committee

CURRICULAR MAP OF COURSES AVAILABLE IN EARTH SCIENCES B.S.

| Course Number | Course Title | PLO A: Read/ evaluate Earth Sci literature | PLO B: Present Earth Sci info | PLO C: Apply Earth Sci data | PLO D: Apply appropriate techniques/ methods | PLO E: Identify Earth Sci problems, develop solutions | PLO F: Apply other sciences | BS program required /elective |
|-------------------------|--|--|--|--|--|--|--------------------------------------|--|
| Earth Sciences 1100 | Planet Earth: How it works | B | B | B | B | B | B | O-prep |
| Earth Sciences 1105 | Geology of the National Parks | B | B | B | | B | B | O-prep |
| Earth Sciences 1108 | Gemstones | B | B | B | | B | B | O-prep |
| Earth Sciences 1121 | The Dynamic Earth | B | B | B | B | B | B | O-prep |
| Earth Sciences 1151 | Natural Hazards | B | B | B | B | B | B | O-prep |
| Earth Sciences 2203 | Environmental Geoscience | B | B | B | | B | B | O-prep |
| Earth Sciences 2205 | The Planets | B | B | B | | B | B | O-prep O-PS |
| Earth Sciences 2206(&S) | Principles of Oceanography | B | B | B | | B | B | O-prep O-SS |
| Earth Sciences 1200 | Introductory Earth Science Lab | | B | B | B | B | B | O-prep |
| Earth Sciences 2000 | Preparation for Thesis and Careers in the Earth Sciences | B-I | B-I | B-I | | B-I | | R-GS R-GP R-CWE |
| Earth Sciences 2122 | Climate and Life over Billions of years on Earth | B-I | B-I | B-I | B-I | B-I | | O-SS R-GS |
| Earth Sciences 2155 | Energy and Environment | B-I | B-I | B-I | B-I | B-I | | O-SS |
| Earth Sciences 2203 | Environmental Geoscience | B-I | B-I | B-I | B-I | B-I | | O-SS |
| Earth Sciences 2204 | Exploring Water Issues | B-I | B-I | B-I | B-I | B-I | | O-SS |
| Earth Sciences 2210 | Energy, Mineral Resources, and Society | B-I | B-I | B-I | B-I | B-I | | O-SS |
| Earth Sciences 2212 | Intro to Earth Materials | B-I | B-I | B-I | B-I | B-I | | O-CWE |
| Earth Sciences 3411 | Water Security for the 21 st Century | I | I | I | I | I | | O-SS |

| | | | | | | | | |
|---------------------------|--|-------|-------|-------|-------|-------|-------|---------------|
| Earth Sciences 5189.02 | Field Geology II | A | A | A | A | A | A | R-GS O-PG |
| Earth Sciences 5191 | Internship in the Earth Sciences | I - A | I - A | I - A | I - A | I - A | I - A | |
| Earth Sciences 5191.01 | Museum Internship | A | A | A | A | A | A | |
| Earth Sciences 5193.xx | Individual Studies | I - A | I - A | I - A | I - A | I - A | I - A | |
| Earth Sciences 5194 | Group Studies | I - A | I - A | I - A | I - A | I - A | I - A | |
| Earth Sciences 5203 | Geo-environment and Human Health | A | A | A | A | A | A | O-CWE O-HG |
| Earth Sciences 5205 | Planetary Science | A | A | A | A | A | A | R-PS |
| Earth Sciences 5206 | Advanced Oceanography | A | A | A | A | A | A | R-MS O-CWE |
| Earth Sciences 5268 | Soils and Climate Change | A | A | A | A | A | A | O-CWE O-HG |
| Earth Sciences 5501 | Museum Databases | A | A | A | A | A | A | O-MC |
| Earth Sciences 5550 | Geomorphology | I-A | I-A | I-A | I-A | I-A | I-A | O-PS O-HG |
| Earth Sciences 5600 | Siliciclastic Depositional Systems | A | A | A | A | A | A | |
| Earth Sciences 5601.01 | Sedimentary Petrology: Sandstones | A | A | A | A | A | A | |
| Earth Sciences 5601.02 | Sedimentary Petrology: Carbonate Rocks and Shales | A | A | A | A | A | A | |
| Earth Sciences 5602.01 | Carbonate Depositional Systems I | A | A | A | A | A | A | |
| Earth Sciences 5602.02 | Carbonate Depositional Systems II | A | A | A | A | A | A | O-MS |
| Earth Sciences 5603 | Stratigraphy | A | A | A | A | A | A | |
| Earth Sciences 5604 | Sequence Stratigraphy | A | A | A | A | A | A | |
| Earth Sciences 5605 | Paleoceano graphy | A | A | A | A | A | A | |
| Earth Sciences 5613 | Micropaleon tology | A | A | A | A | A | A | |
| Earth Sciences 5614 | Paleobiology | A | A | A | A | A | A | |
| Earth Sciences 5615 | Paleoecology | A | A | A | A | A | A | |

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| Earth Sciences 5617 | Petrology of Earth and Planets | A | A | A | A | A | A | |
| Earth Sciences 5618 | Advanced Historical Geology | A | A | A | A | A | A | |
| Earth Sciences 5621 | Introduction to Geochemistry | A | A | A | A | A | A | O-CWE O-HG |
| Earth Sciences 5622 | Stable Isotope Biogeochemistry | A | A | A | A | A | A | O-MS |
| Earth Sciences 5625 | Igneous Petrology | A | A | A | A | A | A | |
| Earth Sciences 5627 | Global Biogeochemical Cycles | A | A | A | A | A | A | |
| Earth Sciences 5628 | Environmental Isotope Geochemistry | A | A | A | A | A | A | |
| Earth Sciences 5629 | Principles of Petrology | A | A | A | A | A | A | |
| Earth Sciences 5636 | Advanced Topics in Mineralogy and Crystallography | A | A | A | A | A | A | |
| Earth Sciences 5641 | Geostatistics | A | A | A | A | A | A | O-GP |
| Earth Sciences 5642 | Geomathematical Analysis | A | A | A | A | A | A | |
| Earth Sciences 5644 | Tectonic Evolution of Continents | A | A | A | A | A | A | |
| Earth Sciences 5645 | Advanced Structural Geology | A | A | A | A | A | A | |
| Earth Sciences 5646 | Geodynamics | A | A | A | A | A | A | O-GP O-PS |
| Earth Sciences 5650 | Glaciology | A | A | A | A | A | A | O-CWE |
| Earth Sciences 5651 | Hydrogeology | A | A | A | A | A | A | O-CWE O-GP R-HG |
| Earth Sciences 5655 | Land Surface Hydrology | A | A | A | A | A | A | O-CWE O-HG |
| Earth Sciences 5656 | Ecohydrology | A | A | A | A | A | A | O-CWE O-HG |
| Earth Sciences 5660 | Geology of Metallic Deposits | A | A | A | A | A | A | |
| Earth Sciences 5661 | Petroleum Geology | A | A | A | A | A | A | O-PG |
| Earth Sciences 5663 | Global Change and Sustainability in the Earth System | A | A | A | A | A | A | O-SS |

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| Earth Sciences 5670 | General and Economic Geology of Selected Areas | A | A | A | A | A | A | |
| Earth Sciences 5676 | Elemental Chemical Analysis using Inductively Coupled Plasma Optical Emission and Mass Spectrometry | A | A | A | A | A | A | |
| Earth Sciences 5680 | Deep Earth Geophysics | A | A | A | A | A | A | O-GP O-PS |
| Earth Sciences 5687 | Borehole Geophysics | A | A | A | A | A | A | O-GP O-PG |
| Earth Sciences 5703 | Principles of Biostratigraphy | A | A | A | A | A | A | |
| Earth Sciences 5713 | Taxonomy and Phylogeny in the Fossil Record | A | A | A | A | A | A | |
| Earth Sciences 5714 | Biometry | A | A | A | A | A | A | |
| Earth Sciences 5717 | Critical Issues in World Freshwater Resources | A | A | A | A | A | A | |
| Earth Sciences 5718 | Aquatic Geochemistry | A | A | A | A | A | A | |
| Earth Sciences 5719 | Environmental Organic Geochemistry | A | A | A | A | A | A | |
| Earth Sciences 5746 | Seminar in Rheological Properties of Solids | A | A | A | A | A | A | |
| Earth Sciences 5751 | Quantitative Ground-Water Flow Modeling | A | A | A | A | A | A | O-PG O-HG |
| Earth Sciences 5752 | Contaminants in Aqueous Systems | A | A | A | A | A | A | |
| Earth Sciences 5754 | Risk Assessment and Management in Earth Systems | A | A | A | A | A | A | |
| Earth Sciences 5779 | Seminar in Physical Properties of Minerals and Rocks | A | A | A | A | A | A | |
| Earth Sciences 5780 | Reflection Seismology | A | A | A | A | A | A | O-MS O-PG |
| Earth Sciences 5781 | Gravity Exploration | A | A | A | A | A | A | |
| Earth Sciences 5782 | Magnetic Exploration | A | A | A | A | A | A | |

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| Geod Sci 5781 | Geodesy and Geodynamics | A | A | A | A | A | A | O-GP O-PS |
| Electives from other departments (Geog, AtmosSC, EEOB, ENR, Chem, Math, etc.) | | | | | | | I-A | |

Program Learning Goals:

- A) Students critically read and evaluate Earth Science literature
- B) Students present Earth Science information in a clear and logical manner, both orally and in writing.
- C) Students apply knowledge of Earth Science data to understand the dynamic physical, chemical, and biological processes of the Earth and its history.
- D) Students apply knowledge of appropriate techniques, field methods, field mapping, and numerical methods to measure, portray, analyze, and interpret Earth Science data in specific subdisciplines.
- E) Students identify Earth Science problems and develop solutions.
- F) Students apply knowledge of modern applications from chemistry, physics, biology, mathematics, statistics, and computing to the solution of Earth Science problems.

Key: B = Beginning level; I = Intermediate level; A = Advanced level

Program Course Listing:

- R- Required
- O - one of multiple option
- prep - preparation (all BS programs)
- SS – science of sustainability (all BS programs)
- GS – Geological Sciences subprogram
- CWE- Climate Water Environment subprogram
- GP- Geophysics subprogram
- MS – Marine Science certificate
- PS- Planetary Science certificate
- HG- Hydrogeology certificate
- MC – Museum Curation certificate
- PG- Petroleum Geology certificate