

ENVS 31: Forest Ecology and Management
Fall Quarter 2024

Course Time: 10a- Tuesdays & Thursdays 10:10am-12:00pm

X-hour used occasionally as needed: Fridays from 3:30pm-4:20pm

Professor: Dr. Shersingh Joseph Tumber-Dávila

Office Hours: Tuesdays from 12:00-1:00 or by appointment

Office Location: Steele 110

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TA: Junior Burks

Office Hours: During the X-hour when not used on Fridays from 3:30-4:20pm in the classroom

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Undergrad TA: Zac Shortt

Office Hours: During the X-hour when not used on Fridays from 3:30-4:20pm in the classroom

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Course Description:

Embark on an enriching journey through the heart of New England's forests in ENVS31: Forest Ecology and Management. Rooted in ecological principles, this course offers a comprehensive exploration of forests and their management practices. Through immersive field experiences, students will cultivate a foundational understanding of forest ecosystems and their intricate dynamics including the relationships between organisms and their environment, the dynamics of forest ecosystems, and the essential role forests play.

ENVS31 introduces students to fundamental ecological concepts essential for comprehending forest ecology and management practices. With a focus on experiential learning, students will engage in immersive field trips, tree identification exercises, and forest inventory techniques. By the course's conclusion, students will emerge equipped with a deep appreciation for the complexities of forest ecosystems and the practical knowledge needed to contribute meaningfully to their conservation, sustainable management, and climate change mitigation in New England and beyond.

Distributive: SLA

Prerequisites: ENVS 2 or 3, or permission of the instructor

Learning Outcomes:

- Evaluate the impacts of forest disturbances, climate change, and invasive species on forest ecosystems.
- Analyze the effectiveness of silvicultural and management practices in promoting forest sustainability.
- Interpret the role of biogeochemical cycles in forests, and the effectiveness of forests as nature-based climate solutions in an ever-changing environment.
- Synthesize and communicate information on complex topics within forest ecology, including relevant ecological theory and implications for forest management.

Required Resources

- *A Beginner's Guide to Recognizing Trees of the Northeast* by Mark Mikolas
- *How to Love a Forest: The Bittersweet Work of Tending a Changing World* by Ethan Tapper
 - Official release on September 10, 2024
 - How to purchase the book: <https://ethantapper.com/book>
 - OR BETTER YET: Purchase from Still North Bookstore in Hanover
 - Ethan will have a book event at Still North on October 8th at 7pm
 - **Ethan will also give a guest lecture in class on November 12th**
- *Reading the Forested Landscape: A Natural History of New England* by Tom Wessels
- *Forest Trees of Maine. Dept of Conservation/Main Forest; Centennial edition*
 - PDF can be downloaded online for free, or purchased directly from Maine.gov
 - https://www.maine.gov/dacf/mfs/publications/handbooks_guides/forest_trees/index.html
- Canvas Connection, <https://canvas.dartmouth.edu/>
- Writing utensil and paper/notebook
- Hard-writing surface/clip board
- Weather-wise clothing for outdoor labs

Course Learning Environment:

This dynamic course is designed to cultivate an inclusive and participatory learning environment, placing a significant emphasis on collaborative engagement and insightful discussions. The course begins with a focus on community building, as students actively contribute to the creation of community norms that will govern the ways we engage and discourse throughout the term. At the outset of the course, students collectively develop a series of community norms, fostering an inclusive space where diverse perspectives are welcomed and respected. This foundational step aims to create a supportive atmosphere that encourages open dialogue and hopefully facilitates the active involvement of all participants.

Throughout the course, a variety of pedagogical techniques are employed to facilitate a broad range of class participation. Online discussion posts provide asynchronous opportunities for reflection and sharing, while think-pair-share activities and small group breakout sessions encourage collaborative problem-solving and in-depth discussions. Regular class check-ins and exit tickets enable brief moments of individual reflection and feedback. By integrating these pedagogical strategies and prioritizing the establishment of inclusive community norms, the course fosters a collaborative and supportive learning environment where all students can actively contribute to the exploration of transformative technologies and their societal implications.

While Tuesday's sessions will mostly be focused on introducing materials through lectures and discussions, Thursday lab sessions will provide an opportunity to apply course materials through experiential learning. Thursday sessions will occur in a variety of settings, including computer labs, field trips, and outdoor experiences. Additionally, Thursday's lab sessions will often have participation from guest lectures/facilitators who are experts in the topic, which could include foresters, land managers, research scientists, etc. **We may need to leave earlier on some Thursdays with field trips in order to accommodate transportation time to and from local field sites** (we will always plan on returning by the end of class time). We have reserved buses for all Thursday sessions as needed.

Course Expectations & Evaluation:

Grading is done in accordance with [Dartmouth's Scholarship Ratings](#), and is calculated based on the below criteria.

Class Participation (15%): This course is centered around facilitating open discussions and hands-on experiential learning during class. Participation is therefore critical for success in the course and will be evaluated through a diversity of opportunities. This includes participation in course check-ins and exit tickets, engaging in small-group and whole-class discussions/activities, and actively participating during the lab session. Additionally, class participation requires adherence to the agreed upon community norms developed and discussed during the first class.

Discussion Board Posts and Feedback (15%): Students will submit responses to weekly discussion board posts via Canvas. The discussion board prompts will be related to the class topic and/or reading for the week. The length and format of the post will differ week to week, but posts will never need to exceed 300-500 words. Students are also expected to write brief responses to two discussion posts from fellow classmates weekly. The discussion board posts and responses will be due by class on Thursdays. The discussion board posts are 10% of the total grade whereas the responses account for 5% of the total grade.

Weekly Lab Assignments (50%): Each Thursday lab session will be accompanied by an assignment/report pertaining to the lab topic. The assignments will be due at the beginning of class on Tuesdays. The lab assignments will be related to data, materials, or products created during the Thursday class-session, therefore attentiveness during lab and careful notetaking will be vital.

Cumulative Final (20%): The final exam will consist of two portions. 10% will be a field practicum, focused on forest measurement and plant identification skills learned during the lab sections. The remaining 10% will be a cumulative take-home examination to be submitted via Canvas.

Course Schedule & Topics:

The course schedule will follow the following format. Tuesday sessions will be mostly lecture and discussion focused, introducing the topic materials for each week. Thursdays will be the lab section, where the week's topic will be applied through a variety of site visits and introduced field, computational, and ecological skills.

The course schedule is subject to change from week to week based on student input, in addition to the emergence of media coverage of pertinent course topics. Required readings, assignments, and discussion prompts will be posted on canvas prior to each class session (readings for Tuesday classes will be posted by end of day the previous Thursday, and Thursday class readings will be posted by Tuesday at

the latest). *The readings posted below are an example of what may be assigned, but as stated previously, all required course materials will be posted on Canvas prior to each class session.*

Week	Dates	Topic & Course Literature
1	September 16-20	<p>Course Introduction, history of North American and New England forests and the global perspective</p> <p>Thursday Lab: A journey of New England forest history through College Park</p> <ul style="list-style-type: none"> ○ <i>Reading the Forested Landscape: A Natural History of New England</i> Countryman Press; 1st edition (September 20, 2005) ○ Foster, D. R. (2017). <i>Wildlands and woodlands: broadening the vision for New England</i>. Harvard University Press. ○ Pan, Y., Birdsey, R. A., Fang, J., Houghton, R., Kauppi, P. E., Kurz, W. A., ... & Hayes, D. (2011). <i>A large and persistent carbon sink in the world's forests</i>. <i>science</i>, 333(6045), 988-993.
2	September 23-27	<p>Tree structure, function, and identification</p> <p>Thursday Lab: use dichotomous key and plant traits to identify tree species on Dartmouth's campus and adjacent woodlands</p> <ul style="list-style-type: none"> ○ <i>Forest Trees of Maine</i>. Dept of Conservation/Main Forest; Centennial edition (January 1, 2008) ○ Thompson, J. R., Carpenter, D. N., Cogbill, C. V., & Foster, D. R. (2013). <i>Four centuries of change in northeastern United States forests</i>. <i>PloS one</i>, 8(9), e72540. ○ Fahey, T. J., Woodbury, P. B., Battles, J. J., Goodale, C. L., Hamburg, S. P., Ollinger, S. V., & Woodall, C. W. (2010). <i>Forest carbon storage: ecology, management, and policy</i>. <i>Frontiers in Ecology and the Environment</i>, 8(5), 245-252.
3	September 30-October 4	<p>Overview of forest ecology: forest composition and forest measurement, inventory, and analysis</p> <p>Thursday Lab: Establish 10-meter forest inventory plots at Fullington Farm Forest to measure DBH, tree height, and practice tree identification</p> <ul style="list-style-type: none"> ○ Bormann, F. H., Siccama, T. G., Likens, G. E., & Whittaker, R. H. (1970). <i>The Hubbard Brook ecosystem study: composition and dynamics of the tree stratum</i>. <i>Ecological Monographs</i>, 40(4), 373-388. ○ Tinkham, W. T., Mahoney, P. R., Hudak, A. T., Domke, G. M., Falkowski, M. J., Woodall, C. W., & Smith, A. M. (2018). <i>Applications of the United States Forest Inventory and Analysis dataset: a review and future directions</i>. <i>Canadian Journal of Forest Research</i>, 48(11), 1251-1268.
4	October 7-11	<p>Forest carbon balance and nutrient cycling</p>

		<p>Thursday Lab: Soil and tree carbon sampling in Dartmouth Woodlands, Hanover, NH</p> <ul style="list-style-type: none"> ○ <i>Finzi, A. C., Giasson, M. A., Barker Plotkin, A. A., Aber, J. D., Boose, E. R., Davidson, E. A., ... & Foster, D. R. (2020). Carbon budget of the Harvard Forest Long-Term Ecological Research site: Pattern, process, and response to global change. Ecological Monographs, 90(4), e01423.</i> ○ <i>Templer, P. H., Pinder, R. W., & Goodale, C. L. (2012). Effects of nitrogen deposition on greenhouse-gas fluxes for forests and grasslands of North America. Frontiers in Ecology and the Environment, 10(10), 547-553.</i>
5	October 14-18	<p>Forest disturbances: fires, hurricanes/wind, drought, and humans</p> <p>Thursday Lab: Visit to Upper Valley soil warming experiment and windthrow sites to see disturbance impacts</p> <ul style="list-style-type: none"> ○ <i>Anderegg, W. R. et al. Future climate risks from stress, insects and fire across US forests. Ecology Letters 25, 1510-1520, doi:10.1111/ele.14018 (2022).</i> ○ <i>Tumber-Dávila, S. J., Lucey, T., Boose, E. R., Laflower, D., León-Sáenz, A., Wilson, B. T., MacLean, M. G., & Thompson, J. R. (2024). Hurricanes pose a substantial risk to New England forest carbon stocks. Global Change Biology, 30, e17259. https://doi.org/10.1111/gcb.17259</i>
6	October 21-25	<p>Invasive species, biotic disturbances, and forest understory</p> <p>Thursday Lab: Understory and invasive plant transect survey at the Trescott lands</p> <ul style="list-style-type: none"> ○ <i>Ellison, A. M., Bank, M. S., Clinton, B. D., Colburn, E. A., Elliott, K., Ford, C. R., ... & Webster, J. R. (2005). Loss of foundation species: consequences for the structure and dynamics of forested ecosystems. Frontiers in Ecology and the Environment, 3(9), 479-486.</i> ○ <i>Dukes, J. S., Pontius, J., Orwig, D., Garnas, J. R., Rodgers, V. L., Brazee, N., ... & Ayres, M. (2009). Responses of insect pests, pathogens, and invasive plant species to climate change in the forests of northeastern North America: what can we predict?. Canadian journal of forest research, 39(2), 231-248.</i>
7	October 28- November 1	<p>Wildlife, biodiversity, and forest interactions</p> <p>Thursday Lab: Plant regeneration and regrowth survey of deer browse enclosures in conserved lands in Hanover, NH</p> <ul style="list-style-type: none"> ○ <i>DeGraaf, R. M., & Yamasaki, M. (2001). New England wildlife: habitat, natural history, and distribution. Upne. (Select Readings, and will be on reserve at the library)</i> ○ <i>Ward, J. S., & Williams, S. C. (2020). Influence of deer hunting and residual stand structure on tree regeneration in deciduous forests. Wildlife Society Bulletin, 44(3), 519-530.</i>

8	November 4-8	<p>Silviculture and Management</p> <p>Thursday Lab: Visit to Class of '66 Lodge below Moose Mountain as an example of conservation-minded management strategies</p> <ul style="list-style-type: none"> ○ <i>Belair, E. P., & Ducey, M. J. (2018). Patterns in forest harvesting in New England and New York: Using FIA data to evaluate silvicultural outcomes. Journal of Forestry, 116(3), 273-282.</i> ○ <i>Wikle, J. L., & D'Amato, A. W. (2023). Stand spatial structure outcomes of forest adaptation treatments in northern hardwood forests in North America. Canadian Journal of Forest Research, 53(9), 721-734.</i>
9	November 11-15	<p>Forests as a nature-based climate solution: sustainability and climate change</p> <p>Thursday Lab: urban forest AR-powered tree measurements and carbon inventory with Working Trees</p> <ul style="list-style-type: none"> ○ <i>Badgley et al. Systematic over-crediting in California's forest carbon offsets program. Global Change Biology, 28, 1433–1445. https://doi.org/10.1111/gcb.15943. (2022)</i> ○ <i>Novick, K., Williams, C., Runkle, B., Anderegg, W., Hollinger, D., Litvak, M., ... & Woodall, C. (2022). The science needed for robust, scalable, and credible nature-based climate solutions in the United States: Full Report.</i>
10	November 19	<p>Future forest scenarios and forest modeling</p> <p>Thursday Lab: Forest vegetation modeling using LANDIS-ii</p> <ul style="list-style-type: none"> ○ <i>Nunery, J. S., & Keeton, W. S. (2010). Forest carbon storage in the northeastern United States: net effects of harvesting frequency, post-harvest retention, and wood products. Forest Ecology and management, 259(8), 1363-1375.</i> ○ <i>MacLean, M. G., Duveneck, M. J., Plisinski, J., Morreale, L. L., Laflower, D., & Thompson, J. R. (2021). Forest carbon trajectories: Consequences of alternative land-use scenarios in New England. Global Environmental Change, 69, 102310.</i>

Academic Honor:

The faculty, administration, and students of Dartmouth College acknowledge the responsibility to maintain and perpetuate the principle of academic honor, and recognize that any instance of academic dishonesty is considered a violation of the [Academic Honor Principle](#).

In the context of this course, students may discuss homework assignments with each other provided that the work they submit for credit is their own. This means that you should understand each step involved in the solution and be able to reproduce it independently.

Policy on using [Generative Artificial Intelligent \(GenAI\) for coursework](#):

Dartmouth recognizes emergent Generative Artificial Intelligence technologies as powerful tools for learning. However, Per the Academic Honor Principle, student use of GenAI tools in submitted work requires appropriate acknowledgment or citation. Students may not use GenAI tools for coursework unless expressly permitted. It is the student's responsibility to clarify questions with their instructor regarding GenAI use in a course and/or instructor expectations for acknowledgement/citation of GenAI.

Religious Observances:

Dartmouth has a deep commitment to support students' religious observances and diverse faith practices. Some students may wish to take part in religious observances that occur during this academic term. If you have a religious observance that conflicts with your participation in the course, please meet with me as soon as possible—before the end of the second week of the term at the latest—to discuss appropriate course adjustments.

Student Accessibility and Accommodations:

Students requesting disability-related accommodations and services for this course are required to register with Student Accessibility Services (SAS; [Apply for Services webpage](#); student.accessibility.services@dartmouth.edu; 1-603-646-9900) and to request that an accommodation email be sent to me in advance of the need for an accommodation. Then, students should schedule a follow-up meeting with me to determine relevant details such as what role SAS or its [Testing Center](#) may play in accommodation implementation. This process works best for everyone when completed as early in the quarter as possible. If students have questions about whether they are eligible for accommodations or have concerns about the implementation of their accommodations, they should contact the SAS office. All inquiries and discussions will remain confidential.

Mental Health and Wellness

The academic environment is challenging, our terms are intensive, and classes are not the only demanding part of your life. There are a number of resources available to you on campus to support your wellness, including: the [Counseling Center](#) which allows you to book triage appointments online, the [Student Wellness Center](#) which offers wellness check-ins, and your [undergraduate dean](#). The student-led [Dartmouth Student Mental Health Union](#) and their peer support program may be helpful if you would like to speak to a trained fellow student support listener. If you need immediate assistance, please contact the counselor on-call at (603) 646-9442 at any time. Please make me aware of anything that will hinder your success in this course.

Title IX

At Dartmouth, we value integrity, responsibility, and respect for the rights and interests of others, all central to our Principles of Community. We are dedicated to establishing and maintaining a safe and inclusive campus where all community members have equal access to Dartmouth's educational and employment opportunities. We strive to promote an environment of sexual respect, safety, and well-being. Through the Sexual and Gender-Based Misconduct Policy (SMP), Dartmouth demonstrates that sex and gender-based discrimination, sex and gender-based harassment, sexual assault, dating violence, domestic violence, stalking, etc., are not tolerated in our community.

For more information regarding Title IX and to access helpful resources, visit Title IX's website ([sexual-](#)

respect.dartmouth.edu). As a faculty member, I am required to share disclosures of sexual or gender-based misconduct with the Title IX office.

If you have any questions or want to explore support and assistance, please contact the Title IX office at 603-646-0922 or TitleIX@dartmouth.edu. Speaking to Title IX does not automatically initiate a college resolution. Instead, much of their work is around providing supportive measures to ensure you can continue to engage in Dartmouth's programs and activities.

Socioeconomic Differences and Financial Difficulty

Our community is composed of students from a variety of financial backgrounds. Socioeconomic diversity can be invisible, and you may be experiencing financial difficulties related to the cost of textbooks, materials, or other necessities for our class of which I am not aware.

If you encounter financial challenges related to this class, there may be sources of support for you. If you feel comfortable sharing your experience with me, you may. You may also consider meeting with a financial aid officer to discuss options, reaching out to the First-Generation Office if you are a first-generation student, browsing the [Funding Resources](#) page, or, for unexpected expenses, applying to the Barrier Removal Fund through the Financial Aid tile in [DartHub](#).