

FOR 322: Forest Mensuration Fall 2022
(3 credits, two 1-hour lectures, one 3-hour lab)

INSTRUCTOR: Dr. Paul Doruska
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Class Time:

Lectures:	Wed.	9:00-9:50am and 10:00 – 10:50am	TNR 120
Lab Section 1:	Tues.	8:00 – 10:50am	TNR 361
Lab Section 2:	Fri.	9:00 – 11:50am	TNR 361

Final Exam: Wednesday, December 21, 2022, 2:45pm – 4:45pm TNR 120

Student Hours: Tuesday 11:00-11:50am and Wednesday 11:00 – 11:50am

Prerequisites: MATH 109 Math. for the Social and Mgmt. Sciences or MATH 111 Appl. Calculus or MATH 112 Trigonometry;
FOR 232 Dendro. and Silvics;
FOR 321 Nat. Res. Data Analysis or MATH 355 Elem. Stat. Methods;
or instructor consent

Text: *Forest Measurements* (2019 6th Edition) by Avery, Burkhart and Bullock
(ISBN 1-4786-3618-1)

Learning Outcomes: Students in this course will learn the principles of describing and measuring rural and urban forest resources. Upon completion of this course, students will be able to:

- (1.) Use descriptive statistics to quantitatively summarize rural and urban forests/data via means, standard deviations, and confidence intervals.
- (2.) Use the US Public Land Survey and/or map scales and/or compass and pacing and/or GPS/GIS to describe tract locations and determine the areas therein.
- (3.) Quantify attributes of trees or logs (diameter, height, length, volume, weight...) found in rural or urban environments with forestry equipment and by using mathematical formulas.
- (4.) Describe forest stands via stand-level attributes (basal area, trees per acre, quadratic mean diameter, site index, ...) and perform related calculations therein.
- (5.) Apply basic sampling designs (simple random sampling, systematic random sampling) and inventory procedures (fixed radius plot and point sampling) when summarizing natural resource inventories for both timber and non-timber resources.

Forestry professionals use these skills and the information gathered via these techniques to provide the information needed for wise stewardship of rural and urban forests or they interact with other natural resource professionals who do. Therefore, by gaining confidence in these skills, students will be establishing the groundwork for providing interpreting, and understanding the information needed to make a variety of forest management- and/or stewardship-based decisions.

Grading:

There will be two written exams (each worth 40 POINTS) and a 75 POINT, comprehensive written final exam over the course of the semester. Exam material will include material discussed in lectures, labs and any assigned readings.

There will be five lecture-based quizzes/homework assignments valued at 15 POINTS each. There will be five laboratory-based assignments valued at 15 POINTS each. One’s lowest 15 POINT (across lecture/lab) will be dropped. There will be one lab report valued at 30 points.

COURSE TOTAL POINTS: 320 points.

Normally, cumulative-weighted percentages will be rounded to the nearest tenth and course grades will be assigned as follows (instructor reserves the right to curve):

91.6% or higher	A	77.6% to 79.5%	C+
89.6% to 91.5%	A-	71.6% to 77.5%	C
87.6% to 89.5%	B+	69.6% to 71.5%	C
81.6% to 87.5%	B	67.6% to 69.5%	D+
79.6% to 81.5%	B-	59.6% to 67.5%	D
		Less than 59.6%	F

Students with Disabilities:

The university has a legal responsibility to provide accommodations and program access as mandated by Section 504 and the Americans with Disabilities Act (ADA). The university’s philosophy is to not only provide what is mandated, but also convey its genuine concern for one’s total well-being. If accommodations are needed, please contact the instructor as well as the Disability Resource Center (DRC), 108 Collins Classroom Center, voice (715) 346-3365; email: drc@uwsp.edu

Attendance Policy

You are expected to attend lectures and labs. No part of this course will be asynchronous unless the need arises.. Laboratory sessions are very important (you will learn concepts in lectures and put them into practice in labs where you will also learn/review/and gain practice with applications of course material). Absences from lecture or lab due to illness, family emergency, or University sponsored activities will be excused provided a written explanation, provided by the student, is given to and acknowledged by the instructor prior to the intended absence except for emergencies in which case an explanation should be turned in as soon as practical. If you are feeling ill please do stay away from our F2F meetings out of respect to the others (again, part of being a professional) – just let your instructor know in advance if possible. If unexcused absences occur on days when assignments are due, then it is your responsibility to see that the assignments are turned in by the assigned due date/time in order to receive credit. Attending a lab section other than your registered section will not be allowed unless pre-approved by the instructor. Missing lecture and/or labs HABITUALLY almost always results in lower grades! You are strongly encouraged to attend all scheduled class meetings.

If you are quarantined/isolated as part of COVID protocols it is your responsibility to inform your instructors (it will be kept confidential, have no worries there) but will allow for better delivery of course material when in quarantine/isolation. The Dean of Students Office determined that this notification is the student’s responsibility.

Indigenous Peoples Lands Recognition

The UW-Stevens Point community recognizes that the University of Wisconsin-Stevens Point occupies the lands of the Ho Chunk and Menomonee people. Please take moments throughout this course to acknowledge and honor this ancestral Ho Chunk and Menomonee land, and the sacred lands of all 14 indigenous peoples.

Inclusive Environment:

This course (and our university!) is an inclusive environment. This course might foster discussion, with respectful exchange of ideas and opinions. Disrespect and disparagement will not be tolerated. We have a great opportunity to learn from each other, and to appreciate and understand our differences. See also the CNR Principles of Professionalism, the Society of American Foresters Code of Ethics, and the Forestry Discipline's anti-harassment statement.

Course Role in Accreditation

If you are a forestry major you know your degree is accredited by the Society of American Foresters (SAF) . That body requires that accredited educational programs meet a total of 40 educational competencies amongst other non-curricular competencies. This course *directly* contributes to the following SAF competencies while indirectly contributing to several others not listed herein.

Forestry Standard:

C4-B.1. Knowledge of basic orienteering skills, including an ability to use a hand compass and pacing, to read maps of different types and to obtain bearings and distances.

C4-B.2. An ability to use appropriate, contemporary technology. Given the rapid changes in technologies used in forestry and understanding the wide range of hardware and software used by employers, the expectation is that students will know about appropriate technologies and how they may be used, and will be able to recognize when answers or results derived through use of an application are outside the reasonable range of correctness.

C4-B.3. Knowledge of the primary land measurement methods and geospatial analyses, including ground-based and remotely sensed methods and their pros and cons.

C4-B.4. An ability to identify and measure discrete land areas and conduct geospatial analyses by appropriate methods.

C4-B.5. An ability to design and implement forest inventories that meet a variety of specific objectives using appropriate sampling methods, equipment (for collecting and recording), and units of measurement.

C4-B.6. An understanding of the constraints and tradeoffs between different inventory methodologies, their effects on desired precision, and how to recommend the most suitable method for the desired outcome.

C4-B.7. An ability to analyze and interpret inventory data and project future forest, stand, and tree conditions as pertaining to a range of management goals and objectives.

University of Wisconsin Stevens Point College of Natural Resources-Principles of Professionalism

The College of Natural Resources at the University of Wisconsin – Stevens Point prepares students for success as professionals in many fields. As a professional, there are expectations of attainment of several personal characteristics. These include:

Integrity

Integrity refers to adherence to consistent moral and ethical principles. A person with integrity is honest and treats others fairly.

Collegiality

Collegiality is a cooperative relationship. By being collegial you are respecting our shared commitment to student education through cooperative interaction. This applies to all involved in the process: students, staff, faculty, administration and involved community members. You take collective responsibility for the work performed together, helping the group attain its goals.

Civility

Civility refers to politeness and courtesy in your interactions with others. Being civil requires that you consider the thoughts and conclusions of others and engage in thoughtful, constructive discussion to express your own thoughts and opinions.

Inclusivity

Inclusivity requires you to be aware that perspective and culture will control how communication is understood by others. While many values are shared, some are quite different. These differences in values should be both considered and respected.

Timeliness

Timeliness is the habit of performance of tasks and activities, planned in a way that allows you to meet deadlines. This increases workplace efficiency and demonstrates respect for others' time.

Respect for Property

Respect for property is the appreciation of the economic or personal value an item maintains. Maintaining this respect can both reduce costs (increase the operable life of supplies and equipment) as well as demonstrate respect for others rights.

Communication

Professional norms in communication require that you demonstrate the value of your colleagues, students, professors or others. The use of appropriate tone and vocabulary is expected across all forms of communication, whether that communication takes place face to face, in writing or electronically.

Commitment to Quality

Quality is the ability to meet or exceed expectations. By having a commitment to quality, we intend to provide a learning environment that is conducive to learning. Intrinsic to this commitment to quality is defining expectation (committed to in a syllabus through learning outcomes), implementation (with quality control in place) and assessment (where meeting of learning outcomes is determined).

Commitment to Learning

Learning is a lifelong process. By being committed to learning you are providing a model for all to follow. This model is not only professor to student but involves all combinations of people within our university and broader community

Adherence to this compact is required of the faculty and staff of the College of Natural Resources and of all students enrolled in College of Natural Resources courses.

Forestry Anti-harassment Statement

Introduction

In adopting this statement, the forestry discipline within the College of Natural Resources (CNR), at the University of Wisconsin-Stevens Point (UWSP) has expectations for professional behavior of its students, staff, faculty, and other associated parties. Anyone who has a reasonable belief that they, or another student, staff, faculty or guest, have been the victim of harassment, bullying, or discrimination, or any other violation in the statement herein, are encouraged and expected to report the conduct. See reporting options and guidelines at the end of this document.

The forestry discipline within the College of Natural Resources is committed to creating a safe, inclusive, and professional environment. The forestry discipline operates under the UWSP harassment, discrimination, and retaliation prevention guidelines, copied here:

“The University of Wisconsin-Stevens Point (UWSP) is committed to fostering an environment that is safe, respectful, and inclusive to all and to educate all employees on these important issues. In addition, we are obligated, under Regent policy and federal regulations, to ensure our employees are informed on the issues of unlawful discrimination, harassment, and sexual violence.”

Statement

The forestry discipline, following the lead of the Society of American Foresters which accredits the B.S. forestry degree, believes we all have a responsibility in creating a safe, inclusive, professional environment in all forestry-related activities and events. All forms of discrimination, harassment, and bullying are prohibited. This applies to all participants in all settings (online and in-person) and locations (on- and off-campus) where forestry classes and associated activities are conducted, including student organization events and activities, committee meetings, workshops, conferences, and other work and social functions where employees, volunteers, sponsors, vendors, or guests are present.

Discrimination is prejudicial treatment of individuals or groups of people based on their race, color, creed, religion, age, sex, sexual orientation, gender identity or expression, national origin, ethnicity, ancestry, disability, pregnancy, marital or parental status, veteran status, or any other category protected by law.

Sexual harassment is unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature that creates an intimidating, hostile, or offensive environment. Sexual harassment constitutes discrimination and is illegal under federal, state, and local laws.

Bullying is unwelcome, aggressive behavior involving the use of influence, threat, intimidation, ridicule, hazing or coercion to dominate others in the professional environment. Bullying behavior may go beyond characteristics protected by applicable laws, including but not limited to, political views, dress, or other outward physical appearances.

Other types of harassment include any verbal or physical conduct directed at individuals or groups of people because of their race, ethnicity, color, national origin, sex, sexual orientation, gender identity, age, religion, disability, veteran status, or any other characteristic protected by applicable laws, that creates an intimidating, hostile, or offensive environment.

The following list, while not exhaustive, includes examples of unacceptable behavior: slurs, jokes, threats, or derogatory comments relating to the characteristics noted above. Examples of inappropriate physical harassment that violate this statement include, but are not limited to: assault, unwanted touching, or impeding or blocking movement. In addition, no individual may be denied admission to, or

participation in or the benefits of, any UWSP-associated events. Similarly, the display or circulation of derogatory or demeaning posters, cards, cartoons, emails, texts, videos, and graffiti which relate to characteristics noted above violate this statement.

Reporting

Students, staff, faculty, or guests associated with Forestry-related programming who experience or witness incidents of harassment are strongly encouraged to report the incident. The Forestry discipline strongly urges the prompt reporting of complaints or concerns so that rapid and constructive action can be taken.

Reporting can be done online or in person, to a faculty or staff member, and/or the UWSP Dean of Students. Anonymous reporting is available.

The UWSP Title IX Website is the home for all information related to harassment and discrimination, including reporting options, student and employee resources, and information about what happens after a report is submitted:

<https://www.uwsp.edu/titleix/Pages/default.aspx>

Important information about any online course materials and any online course endeavors

Instructor Recordings and sharing class lectures (if applicable)

If a lecture recording only includes the instructor, the recording is not a student record and not considered protected by FERPA. If a recording includes student interactions (questions, presentations, etc.) and those students are identifiable, the recording would be a protected educational record. The recording could only be made available to the students in that specific class and/or to university officials with legitimate educational interest in that information – a genuine need for access to perform their duties. If the instructor wishes to further share the recording outside of the class, either identifiable students would have to provide written consent to release their participation or portions of the recording would have to be changed or omitted to avoid identifying students. But again, if no students are identifiable in any way (seen, heard or named), the recording would not be FERPA protected. Additionally, recordings that include student interactions are appropriate for posting within Canvas.

Student Recording and Sharing Class Lecture

Sometimes students record lectures or copy lecture materials (including potentially instructor's recordings) and post them outside of class on internet sites or provide them to note sharing companies. These acts can violate intellectual property rights held by the instructor and the university. UW System Board of Regent policy authorizes instructors to limit or restrict students from copying, recording or using instructional materials or lectures unless necessary to reasonably accommodate a student's disability. [Regent Policy Document 4-1] If an instructor wishes to impose restrictions, the instructor should inform students of the limitations and the potential consequences of being subject to charges of student misconduct. Notification can be made through a syllabus, a lecture, or by other means to ensure awareness

Given the above please note that any and all Lecture/Lab materials and recordings for FOR 322 are protected intellectual property at UW-Stevens Point. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture/lab is not already recorded, you are not authorized to record lectures/labs without instructor permission unless you are considered by the university to be a qualified student with a disability requiring accommodation. [Regent Policy Document 4-1] Students may not copy or share lecture materials and recordings outside of class, including posting on internet sites or selling to commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

Preamble

Service to society is the cornerstone of any profession. The profession of forestry serves society by fostering stewardship of the world's forests. Because forests provide valuable resources and perform critical ecological functions, they are vital to the wellbeing of both society and the biosphere.

Members of SAF have a deep and enduring love for the land, and are inspired by the profession's historic traditions, such as Gifford Pinchot's utilitarianism and Aldo Leopold's ecological conscience. In their various roles as practitioners, teachers, researchers, advisers, and administrators, foresters seek to sustain and protect a variety of forest uses and attributes, such as aesthetic values, air and water quality, biodiversity, recreation, timber production, and wildlife habitat.

The purpose of this Code of Ethics is to protect and serve society by inspiring, guiding, and governing members in the conduct of their professional lives. Compliance with the code demonstrates members' respect for the land and their commitment to the long-term management of ecosystems, and ensures just and honorable professional and human relationships, mutual confidence and respect, and competent service to society.

On joining the SAF, members assume a special responsibility to the profession and to society by promising to uphold and abide by the following:

Principles and Pledges

1. Foresters have a responsibility to manage land for both current and future generations. We pledge to practice and advocate management that will maintain the long-term capacity of the land to provide the variety of materials, uses, and values desired by landowners and society.
2. Society must respect forest landowners' rights and correspondingly, landowners have a land stewardship responsibility to society. We pledge to practice and advocate forest management in accordance with landowner objectives and professional standards, and to advise landowners of the consequences of deviating from such standards.
3. Sound science is the foundation of the forestry profession. We pledge to strive for continuous improvement of our methods and our personal knowledge and skills; to perform only those services for which we are qualified; and in the biological, physical, and social sciences to use the most appropriate data, methods, and technology.
4. Public policy related to forests must be based on both scientific principles and societal values. We pledge to use our knowledge and skills to help formulate sound forest policies and laws; to challenge and correct untrue statements about forestry; and to foster dialogue among foresters, other professionals, landowners, and the public regarding forest policies.
5. Honest and open communication, coupled with respect for information given in confidence, is essential to good service. We pledge to always present, to the best of our ability, accurate and complete information; to indicate on whose behalf any public statements are made; to fully disclose and resolve any existing or potential conflicts of interest; and to keep proprietary information confidential unless the appropriate person authorizes its disclosure.
6. Professional and civic behavior must be based on honesty, fairness, good will, and respect for the law. We pledge to conduct ourselves in a civil and dignified manner; to respect the needs, contributions, and viewpoints of others; and to give due credit to others for their methods, ideas, or assistance.

Academic misconduct will not be tolerated. Note the following as per the Univ. of Wisc.-Stevens Point Community Bill of Rights and Responsibilities:

UWSP 14.03 ACADEMIC MISCONDUCT SUBJECT TO DISCIPLINARY ACTION.

- (1.) Academic misconduct is an act in which a student
- (a) Seeks to claim credit for the work or efforts of another without authorization or citation;
 - (b.) Uses unauthorized materials or fabricated data in any academic exercise;
 - (c.) Forges or falsifies academic documents or records;
 - (d.) Intentionally impedes or damages the academic work of others;
 - (e.) Engages in conduct aimed at making false representation of a student's academic performance;
- or
- (f.) Assists other students in any of these acts;
 - (g.) Violates electronic communication policies or standards as agreed upon when logging on initially (See <https://www3.uwsp.edu/infotech/Pages/Policies/Policies.aspx>).

(2) Examples of academic misconduct include, but are not limited to: cheating on an examination; collaborating with others in work to be presented, contrary to the stated rules of the course; submitting a paper or assignment as one's own work when a part or all of the paper or assignment is the work of another; submitting a paper or assignment that contains ideas or research of others without appropriately identifying the sources of those ideas; stealing examinations or course materials; submitting, if contrary to the rules of a course, work previously presented in another course; tampering with the laboratory experiment or computer program of another student; knowingly and intentionally assisting another student in any of the above, including assistance in an arrangement whereby any work, classroom performance, examination or other activity is submitted or performed by a person other than the student under whose name the work is submitted or performed.

UWSP 14.04 DISCIPLINARY SANCTIONS.

- (1) The following are the disciplinary sanctions that may be imposed for academic misconduct in accordance with the procedures of s. UWSP 14.05, 14.06 or 14.07:
- (a) An oral reprimand;
 - (b) A written reprimand presented only to the student;
 - (c) An assignment to repeat the work, to be graded on its merits;
 - (d) A lower or failing grade on the particular assignment or test;
 - (e) A lower grade in the course;
 - (f) A failing grade in the course;
 - (g) Removal of the student from the course in progress;
 - (h) A written reprimand to be included in the student's disciplinary file;
 - (i) Disciplinary probation; or
 - (j) Suspension or expulsion from the university.
- (2) One or more of the disciplinary sanctions listed in sub. (1) may be imposed for an incident of academic misconduct.

Required Statement on Emergency Preparedness:

In the event of a medical emergency, call 911 or use red emergency phone located outside Rm151 or 172 on the first floor; 2nd floor between Rms 252 and 255 or between Rms 219 and 221 (on other side of hall); 3rd floor by Rms 320 or 358. Offer assistance if trained and willing to do so. Guide emergency responders to victim.

In the event of a tornado warning and on the 3rd floor proceed to the southern hallways on the 1st or 2nd floors, away from the windows. Those are appropriate shelters.

In the event of a fire alarm, evacuate the building in a calm manner. Meet at the northwest corner of parking lot E. Notify instructor or emergency command personnel of any missing individuals.

Active Shooter – Run/Escape, Hide, Fight. If trapped hide, lock doors, turn off lights, spread out and remain quiet. Follow instructions of emergency responders.

Lecture Outline

Day of	Topic(s)	Readings	Assignment ¹
9/7	Introduction/Units of Measure	Chapter 1, 4	Assessment Ques.
9/14	Measuring Standing Trees	Chapter 4, 7	
9/21	Measuring Standing Trees/Volume Terminology	Chapter 7, 8	Problem Set or Quiz
9/28	Log Rules/Scaling Practices	Chapter 5, 6	
10/5	Weight Scaling/Standing Volume and Weight Estimation	Chapter 6, 8	Problem Set or Quiz
10/12	Sample Size Determination/Intro to Forest Inventory	Chapter 2 & Chapter 3.1 to 3.7	
10/19	Intro. to Forest Inventory/Test 1	Chapter 9.1 to 9.10	
10/26	Fixed Radius Plot Sampling	Chapter 10	Problem Set or Quiz
11/2	Forest Inventory and Analysis (FIA)/Intro to VRP Sampling	Chapter 11	
11/9	Variable Radius Plot (VRP) Sampling	Chapter 11	Problem Set or Quiz
11/16	Proportions/Stand and Stock Tables/Stratified Sampling/Site Index	Chapter 9.11 Chapter 3.8 to 3.11; & Chapter 15.1 to 15.10	
11/23	Other Inventory Methods		
11/30	Growth and Yield/Test 2	Chapters 16, 17	
12/7	Other Measures	Chapter 15.11 to 15.20	Problem Set or Quiz
12/14	Other Measures/Course Wrap-up	Chapter 15.11 to 15.20	
12/21	Comprehensive Final	2:45-4:45pm	

Laboratory Outline

Lab of	Topic(s)	Task/Assignment ¹
9/6	Tuesday lab only: get to know you meeting	
9/9 or 9/13	Excel	
9/16 or 9/20	Measuring Diameters and Heights* (hh)	
9/23 or 9/27	Standing Tree Measures* (hh)	
9/30 or 10/4	Carbon Sequestration and Inventories (required) & Stat. Review (optional)	
10/7 or 10/11	Volume/Weight Estimation* (hh)	Handout Questions
10/14 or 10/18	GPS/GIS*	
10/21 or 10/25	GPS/GIS* (hh)	Handout Questions
10/28 or 11/1	Fixed Radius Plot Sampling* (hh)	Report
11/4 or 11/8	FIA & Map Reading	Handout Questions
11/11 or 11/15	Variable Radius Plot Sampling* (hh)	Handout Questions
11/18 or 11/22	Stratified Sampling	
11/29 or 12/2	Growth Measures* (hh)	Handout Questions
12/6 or 12/9	Growth and Yield Modeling	
12/13	Tuesday lab only: topic TBD	

Note: Labs marked with asterisks indicate some, or all, of that lab will be outdoors. For such labs, you are expected to dress appropriately for the weather/conditions so that you will be comfortable while working in the field. Be prepared for mosquito activity as well. Watch the weather forecast and be prepared for cold, rain, and snow. A warm hat, gloves, and layered clothing are important for cold weather. Rain gear is important for rainy weather. You are *strongly encouraged* to wear field shoes/boots of some kind for all outdoor labs. As forestry professionals, safety should always be on our minds. Therefore, hardhats (hh) should be worn for the labs as noted.

¹Any task/assignment is listed in the week it will be assigned. Due dates will be provided at the time the task/assignment is handed out or announced.

Forestry Knowledge/Skills Assessment Exam Topical Areas

FOR 322 is one of the classes that compose the knowledge base tested as part of the Forestry Knowledge/Skills assessment exam (the junior-level exam and the FOR 449 assessment process). Therefore, many students enrolled in this class take these exams. Basic skills from FOR 322 covered on these exams focus on one's ability to correctly:

- (1.) apply both fixed radius plot sampling and variable radius plot sampling (point sampling) concepts, respectively, and analyze inventory data therein,
- (2.) identify/use/define terminology commonly used in forest measurements,
- (3.) identify/describe/employ measures of site index.
- (4.) apply 1-inch and 2-inch DBH classes and 10-foot height classes,
- (5.) describe proper use of common forestry equipment (diameter tape, prism, clinometers, Biltmore stick)
- (6.) determine cubic foot volume of logs,
- (7.) describe, use and convert measures of volume, weight, length, and area,
- (8.) describe or compare stem form/taper via Girard form class, and
- (9.) identify merchantability standards for hardwood and softwood sawtimber and pulpwood.

Additionally skills utilized in FOR 322 and also covered in the junior-level exam and the FOR 449 assessment process include correctly: using map scales to determine distances or areas, identifying features as found on air photos and topographic maps, converting between azimuths and bearings, and determining foresights from backsights (or vice versa).