SYLLABUS FALL 2022

Plant Diversity and Evolution Lab (11:216:412) {undergraduate, 1 credit}
& Plant Systematics Lab (16:215:508) {graduate, 1 credit}

Thursdays in 194 Foran Hall Section 1: 10.00 AM -1.20 PM Section 2: 2.00-5.00 PM

Instructor: Dr. Lena Struwe Email: **lena.struwe@rutgers.edu** Office hours by appointment	**Teaching Assistant:** Dylan Simpson Email: dylan.simpson@rutgers.edu Office hours by appointment
The teaching assistant is the primary person to contact regarding assignments, lab grades, absences, etc.	
You will not get a response if the answer to your emailed question is available on the course website. Always check there first.	

INTRODUCTION

The evolution and diversification of land plants have shaped life on Earth both in past times and today. They are crucial for the survival of terrestrial ecosystems and the human species. This is the lab course that can be taken as a companion to the class Plant Diversity and Evolution / Plant Systematics, and if you are an undergraduate student you have to take the lecture course when you take the lab. The class includes developing skills in plant identification (especially of NJ plants), learning vouchering techniques for plant collecting inventories, ethnobotany, phylogenetic analysis and understanding macroevolutionary patterns in morphology and species diversification.

Reference guides along with digital and online tools and resources will be strongly emphasized while working on real world problems such as local biodiversity inventories and identification of unknown wild plants. Labs will include freshly collected or preserved material of hundreds of species (from local areas, Rutgers Gardens, supermarkets and farmer markets, Floriculture greenhouse, Ethnobotanical and Fossil Teaching Collection, and Chrysler Herbarium).

LEARNING GOALS

Intelligence is not innate; it is earned through hard work. The best way to succeed in this course is practice and preparation. In this lab you will:

1. Build appreciation for the diversity of plant life on the planet and use botanical language to categorize that diversity
2. Interpret data derived from modern phylogenetic tools used by plant scientists to understand plant diversity and evolution
3. Understand the theory behind how phylogenies of plant groups are reconstructed using phylogenetic methods.
4. Use plant morphology vocabulary to classify structures on over 200 plants and to describe evolutionary relationships between these plant groups.
5. Identify genera of common New Jersey native and naturalized plants using printed and digital resources.
6. Recognize 150 plant species in 50 major plant families of ecological and human importance (see Table 1 and additional handouts).
7. Prepare 7 voucher specimens of wild plants collected anywhere in the US this semester in a format that could be used for biodocumentation and research (graduate students: 14 vouchers).

COURSE WEBSITE

The course website is on Canvas and has the syllabus, schedule, messaging, handouts, announcements, your grades, and select resources. Sign into Canvas using your NetID at https://canvas.rutgers.edu/

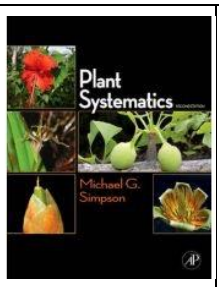
SUPPLIES FOR LABS AND FIELDWORK

*****Bring your text book, hand lens, pencils and dissecting kit every week*****

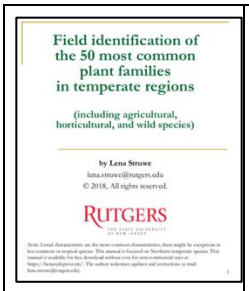
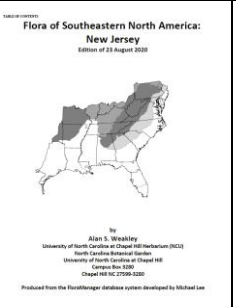
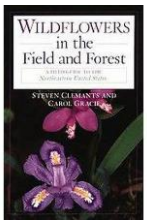
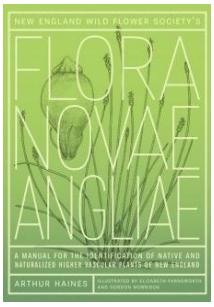
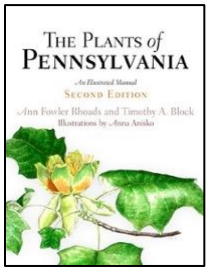
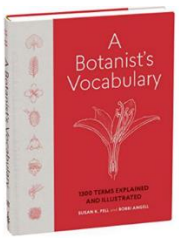
- **Hand lens** (10X, you do not need higher magnification) preferably with neckband so you don't drop it and loose it – good illuminated hand lenses can be bought through Amazon and other websites (for example, SE Illuminated Loupe, model B0013E3DAG, 10-20x, 21 mm), other models are fine too.
- **Pencils and erasers** for lab worksheets and lab drawings. Please use pencils for lab worksheets, especially for drawings, not pens.
- **A clip board** (optional, but useful!!) for writing and drawing during class.
- **10-30 cm ruler** (make sure it is marked in both cm and inches), useful for plant ID
- **Dissecting kit** (can be ordered through Carolina Biological Supply, Student Dissecting Set kit I is fine [item # 621096], others are equally good), including:
    - **Fine point forceps**
    - **Dissecting needle/long pin**, for dissecting of grasses and other small flowers in field and lab (regular sewing pin with plastic head or big safety pin is fine, if you can keep it in a safe place, etc.)
    - **Razorblades or scalpel** (for cutting plants, some razorblades provided in lab)
- **Field notebook and water-resistant pen or pencil** (optional, but highly recommended)
- **Plastic bags** (optional, for collecting plants in the field or transporting them between field and lab)
- **Plant press and blotting paper** will be provided. If you would like to purchase your own we recommend the student press from Carolina Biological Supply, cat. #663060.
- **Old newspapers and cardboard** for plant pressing (Daily Targum is the perfect size, cardboard you can get from local stores) – your borrow press will contain enough cardboard for 7 specimens.
- **Garden shears, heavy-duty scissors or field knife** for plant collecting (optional)
- **Digital camera, or phone with camera** (optional, highly recommended).
- **Appropriate clothing** Lab room temperature fluctuates but is often very cold. Wear layers. For field work, take precautions to avoid ticks and poison ivy by wearing long pants, long sleeves and sturdy shoes. Insect repellent is recommended for fieldwork.

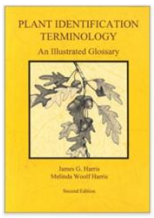
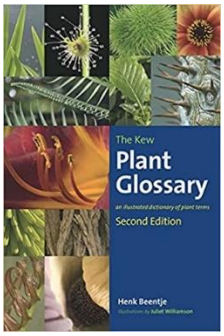
BOOKS and other COURSE MATERIALS

Textbook and other books (borrowed and rented books or ebooks are perfectly fine):



THIS IS THE MANDATORY TEXTBOOK FOR LAB!
Simpson, M. 2019. ***Plant Systematics***, edition 3 (or ed. 2, see below). Elsevier Press. **We will use this book in lab every week. We highly recommend you purchase or rent your own copy**. Note, part of this book (family descriptions) will function as a dictionary to look up information in, the other chapters will be highly important for you to understand and review topics. If you get edition 1 or 2 there will be differences from edition 3 and some chapters will be missing or rewritten; you may use edition 1 and 2 if you want at your own risk. We will provide page numbers for reference for edition 2 and 3. This is a great book for starting your career in plants and you will use it often.

	To aid in your study, Dr. Struwe created a **manual of how to identify the 50 most common families (download the pdf here:** https://botanydepot.com/2018/01/28/50tempmanual/**)** a **list of families** that you should be able to recognize and a worksheet for these (printed handout and on course website), **a list of ethnobotanical and common wild species (printed handout and on course website)** you should learn, and a list of **plant morphology (printed handout and on course website)** words you should learn.
	Weakley, A. 2020. ***Flora of Southeastern North America: New Jersey***. This work contains all wild and naturalized vascular plants of New Jersey, and you can use it to key out and check identifications. It is available as a free pdf file on the course website. It does not have any images, but includes good keys and descriptions to all species.
	Clemants, S. &. C. Gracie. 2006. ***Wildflowers in the Field and Forest****: A Field Guide to the Northeastern United States* (Jeffrey Glassberg Field Guide Series). Oxford University Press. **OPTIONAL BOOK**, but it is **highly recommended to have at least one local flora**. However, only this book includes wildflowers, so no trees, shrubs, or grass-like plants are included. Great photos.
	Haines, A. 2011. ***Flora Novae Angliae****: A manual for the identification of Native and Naturalized Higher Vascular Plants of New England.* New England Wildflower Society & Yale University Press, New Haven. **OPTIONAL BOOK** but highly recommended for those of you that will continue to identify wild plants after the class is over. Includes all vascular plants, many line drawings, no photos. Comprehensive with good keys, no photos, small drawings, and covers nearly all New Jersey plants even if we are not in New England (only southern and some coastal plants are absent). The companion website is GoBotany.
	Rhoads, A.F. & T.A. Block. 2007. ***The Plants of Pennsylvania***: *An Illustrated Manual*. Ed. 2. University of Pennsylvania Press. **OPTIONAL BOOK** but highly recommended for those of you that will continue to identify wild plants after the class is over. Includes all vascular plants, some line drawings, no photos. Totally comprehensive with good keys and covers most of New Jersey plants around the Rutgers Campus. Heavier and thicker than Flora Novae Angliae, but somewhat easier to use.)
	Pell, S. & B. Angell, *A Botanist's Vocabulary: 1300 Terms Explained and Illustrated.* Timber Press. Recommended and optional, but there are many other useful books out there about plant morphology and the meaning of scientific words. Floras also usually contain glossaries.

	Harris, J.G. & M. W. Harris, *Plant Identification Terminology: An Illustrated Glossary.* 2001. Spring Lake, Publ. Useful for morphology and botanical terms.
	Beentje, H. 2016. ***The Kew Plant Glossary: An Illustrated Dictionary of Plant Terms***. 2nd ed. Royal Botanic Gardens, Kew. Comprehensive dictionary of botanical terms, worldwide scope.

Additional Books: Any Trees and shrub guides, Moss floras, Lichen floras, Aquatic plant floras, Gleason and Cronquist's flora (a bit outdated, but excellent for career botanists nonetheless).

ATTENDANCE

If you miss a lab due to an emergency or illness, you need to report this through the Rutgers absence reporting system (use https://sims.rutgers.edu/ssra/). Lab attendance is mandatory, however we understand that illness and emergencies do occur. To account for this, the lowest lab worksheet grade will be dropped at the end of the semester and your best worksheet grade will be doubled. This means if you are absent once, that zero will be replaced with your best worksheet grade. If you are absent twice, you will get one zero averaged into your worksheet and attendance grades. If you will be absent for an extended period due to prolonged illness, a mental health issue or personal circumstances that are sensitive in nature, you must contact the Dean of Students office (848-932-2300) to get a verification letter. We will work with you and your Dean to make special accommodations on a case by case basis.

Absences not based on illness or emergencies will result in a zero grade on the assignment, and that grade cannot be changed.

If you are absent, you must contact other students in the class and ask them to send you the work you missed. Those students will be allowed to photograph plant material and worksheet pages so that you may use them to prepare for quizzes. Blank worksheets will also be available on the course website after each lab.

If you know you are going to be away for a valid reason that may be excused (assessed on case by case basis), contact the TA at least one week ahead of time so that makeup work can be arranged.

If you have an emergency and miss a quiz, you must also report your absence before the start of the lab period with the quiz. Later you will be asked to provide documentation of the emergency to be eligible for a make-up quiz, or you will get a zero for missing the quiz.

Your attendance points will be affected by late arrival (more than 5 minutes late) and general participation level in the class.

COVID SAFETY

Even though we are back in person, we recognize things are not entirely back to normal. To reduce the risk of spreading COVID, **masks must be worn in lab at all times**.

If you are unable to come to class because of COVID, we will work our best to accommodate. In cases of illness, see the above policies regarding absences. In cases of isolation (e.g., due to a sick

roommate, or isolation after a positive test but without symptoms), we will provide alternate assignments that can be completed outside, where you can avoid close contact with others.

If *we* are unable to come to class because of COVID, we will send information through email and Canvas announcements. In such cases, we will likely provide alternate, remote assignments. **So, please be attentive to email and Canvas alerts**!

GRADING, ASSIGNMENTS & ASSESSMENT

Grading and Points

Achievement of the learning goals in class will be assessed through the evaluation and grades of the following:

Grading points	**Points (undergraduate/graduate)**
Lab quizzes	90 (3 quizzes @ 30 points each)
Lab and fieldtrip worksheets	120 (12 worksheets @ 10 points each)
Herbarium collection assignment	21/42 (7 collections for undergrads/14 for graduate students; @ 3 points each)
Herbarium collection forum	15 (3 posts @ 5 points each)
Attendance and participation	28 (lateness and phone use will affect this grade)
Total	274/295 points (undergraduate/graduate)

We will use the gradebook on the course website so you can check your current grade at all times (though we will make adjustments at the end for absence grades, see 'Attendance' above). If you feel like you are falling behind, come and talk to us about ways to improve your performance. We are here to help you learn, and our goal is for all students to achieve an A if they put in the effort and use the learning resources provided.

Final grades:

A	90-99 %	B+	85-89 %	B	80-84 %
C+	75-79 %	C	70-74 %	D	60-69 %
F	less than 60% of total grade				

There will be no curving of grades, however, we reserve the right to raise the final grades of students that show outstanding participation in the class. There are no extra credit options in this lab class.

Worksheets

Undergraduates will be graded according to undergraduate standards, graduates according to graduate standards on similar assignments. Some parts of lab worksheets will only apply to graduate students. All in-class quizzes and labs are different for undergrads and graduates to reflect different learning requirements.

Lab worksheets are due to your TA at the end of each lab period, SHARP. Late work will receive a zero. When observing and evaluating plants and their characters, drawings are an invaluable tool. Bring a sharp pencil and an eraser to lab. Draw many pictures of plant parts in your notebooks and on your lab worksheet, mark down the names of the parts and plants (Latin genus and family names required). Write legible and neatly. Lab worksheets that cannot be read by us will not be graded. Grades will be assessed on both drawings and text (content and understanding only, not artistic ability - no da Vinci is expected here).

All work presented on the lab sheets must be original and your own work, so no copying from others, no copying from textbook or manuals. Make your own observations, drawings, and notes. Copying equals plagiarism, so do not do it. You can work in teams during the lab (not at quiz time!) if you like, but NEVER copy anybody else's text for the lab assignments or projects.

Any use of your phone, tablet, or computer for activities not required for class while class is in session will result in you being asked to leave the classroom and also affect your attendance grade (for exceptions, contact the TA, for example if you have your textbook as an ebook). You are not allowed to use internet resources to answer questions on the worksheet, unless directed to do so by the instructors.

For the herbarium project you can work in teams for collection, but you cannot collect from the same individual plant and then submit as 2 separate vouchers/observations! Any plagiarism or cheating will be reported to higher authorities at the university (see Academic Integrity below).

Herbarium Collection Project - *If you do not submit a plant collection, you will fail the course*

Goals: Learn how to collect, voucher, and identify plants. Learn how to make permanent and professional herbarium collections.

You must** carefully read over the entire ***Guide to Plant Collecting on the course website for complete instructions***

Herbarium Collection Rules:

- **7 different non-cultivated species** representing 7 **different** vascular plant families should be collected, pressed, and labeled. (Graduate students need to collect **14 different non-cultivated species** from **14 different** vascular plant families.)
- Collected plant species must be plants that do not appear on the "Species Not Allowed for Herbarium Project" list (= iNaturalist species bingo from lecture class).
- The specimens should be properly documented, pressed, dried, and determined to the correct species before they are handed in.
- All labels should be neat and contain all necessary information.
- All plants should be **fertile** (have flowers and/or fruits or seeds) and have properly prepared and TYPED collection labels. Labels must follow to format shown in the "Guide to Plant Collecting."
- All plants should be neatly pressed, preserving important morphological features, and not look sloppy (i.e., they should have scientific value).
- Submit printed copies of your Herbarium Collection Grading Rubric and Plant ID Reasoning document. Graduate students must include 2 grading rubric pages.
- **All specimens must be properly dried for full credit.** The drying process could take up to two weeks, so make sure you have collected all your plants by October 27th at the latest. It is better to collect early in the semester to ensure plants are still showing reproductive parts. For more details on drying methods, refer to the *Guide to Plant Collecting.*

Plant presses will be lent out to students. Plant presses must be returned before or when finished collection are due, with all cardboard and blotting paper intact.

Along the way, post photos of your specimens in the **Herbarium Collection Forum** on Canvas. This will provide opportunity for feedback from early on, learn from others' successes, and provide an incentive to get started early! See Canvas for details.

Finished collections should be handed in like this:

Loose plants in folded newspaper, with a loose collection label. No labels or plants should be taped or glued to any paper. Place your stack of newsprint and pressed plants in between two hard cardboard pieces and secured with tightly tied string. You cannot use the plant press ventilators for this, you must provide your own cardboard (Plan ahead and save a big cardboard box for this). Mark your name clearly on the cardboard and hand in to the TA at the beginning of your lab period. With your collection you must also hand in filled out and **printed** copies of your Herbarium Collection Grading Rubric **and** Plant ID Reasoning document.

NOTE**:** Collections (& completed grading rubric) will be returned to students. After grading is finished, you may donate specimens to the Chrysler Herbarium if you prefer (the herbarium will accept all properly labeled specimens in good condition as part of the Rutgers permanent research collection).

Lab ("practical") quizzes – 60 min

The hands-on lab exams will include material from the labs and the relevant parts in the textbook. The three lab quizzes will cover the material seen in the lab plus some 'unknowns' and focus on the families and species you need to know by heart, plant identification, and plant terminology. Included in the lab quizzes will be, among other things, determining plants using keys, descriptions of plants or plant parts, morphological terms, and determination of plant families to know (see list). The last lab quiz will last up to 2 hours, be cumulative for the whole class, and include a longer plant identification component.
Cheat sheets **-** During lab quizzes you are allowed to bring with you 1 letter-sized page (you may write on both front and back). This page must be ***handwritten*** notes. They may be in any language/color but must be your own handwriting and drawings. No computer or photo-copied text or images are allowed on these sheets. It has been shown that the preparation by hand of such notes helps you learn the material and is also an excellent way to provide yourself with a quick review page for future use (students usually keep these for the future). You can write small, in different colors, and in any text type you want, but you are only allowed one sheet for each quiz period, giving a total of three cheat sheets at the end of class. No other materials and help are allowed during lab quizzes. The TA will inspect all cheat sheets before the exams starts. **Note – cell phones, computers, and calculators are not allowed during quizzes.**

LAB AND FIELD SAFETY

Many plants are poisonous and can cause severe reactions, even death. Be careful not to get anything in your eyes or your mouth, unless we specifically say a plant is edible. We might also work with alcohol-preserved specimens. Gloves will be provided for this in lab. Wash your hands after working with all material, and you **cannot eat or drink** in the lab. Edible plants will be provided outside the lab (where you also have access to restrooms for handwashing). Dress in suitable clothes for the outdoor field trips and field collecting – boots/sneakers, long pants and long-sleeved shirts are recommended. Be aware of ticks and mosquitos, poison ivy and plants with thorns. Do not go alone to remote places on campus and bring a cell phone in case you get lost and/or need help. Use common sense and be responsible.

NOTICE FOR STUDENTS WITH DISABILITIES

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/registration-form .

STATEMENT OF DIVERSITY AND INCLUSION

It is our intention that students of all backgrounds will be well served by this course. We will work to create an environment of **inclusion** which respects and affirms the inherent dignity, value, and uniqueness of all individuals, communities and perspectives. We are lucky to have a diverse university. Diverse voices and life experiences enhance the learning process and we welcome students to share their personal experiences. We will not tolerate disrespectful language or behavior against any individual or group. If you feel as though you have been disrespected or treated unfairly by the instructors or any other individual please let us know. You may speak with the instructors in person, over email or report anonymously using the feedback note box. You may also report bias to the Rutgers Diversity and Inclusion initiative using this link: http://inclusion.rutgers.edu/report-bias-incident/ .

LAND ACKNOWLEDGEMENT

We acknowledge that we will be conducting class and collecting plant specimens on the traditional homelands of the Lenape people. **Why do we recognize the land?** "To recognize the land is an expression of gratitude and appreciation to those whose territory you reside on, and a way of honoring the Indigenous people who have been living and working on the land from time immemorial. It is important to understand the long-standing history that has brought you to reside on the land, and to seek to understand your place within that history. Land acknowledgements do not exist in a past tense, or historical context: colonialism is a current ongoing process, and we need to build our mindfulness of our present participation. It is also worth noting that acknowledging the land is Indigenous protocol." (Sourced from http://www.lspirg.org/knowtheland/ .)

SECURITY OF BASIC NEEDS

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students for support. Furthermore, please notify the professor if you are comfortable in doing so. The Rutgers Student Food Pantry is located at 39 Union Street on the College Avenue Campus. If you have mobility issues please call 848-932-5500 for an appointment and they will make arrangements to meet you at another location on campus. A 2018 survey found that 1/3 of all students at Rutgers have experienced food insecurity at some point during the semester. You are not alone and we are here to help.

ACADEMIC CONDUCT AND INTEGRITY

All instances of plagiarism or other unacceptable and unethical academic conduct will be reported to the Office of Student Conduct or the Graduate School and might result in warnings or suspension according to Rutgers' official rules. Believe me, you do not want this to happen to you. See special handout about Rutgers policy in Academic Integrity.

Especially, ***write everything by yourself, and never copy information from your classmates, the internet or publications***. Please follow copyright laws and source citations when using images of any kind. Please remember to cite all sources for information in any reports.

During lab quizzes, avoid looking at other students' worksheets at all times, and do not talk to each other. Students not following these rules will be removed from the lab and get a 0 on the quiz. Lab quizzes start on time, and no additional time will be allowed for late arrivals.

Table 1.

VASCULAR PLANT FAMILIES ALL STUDENTS SHOULD BE ABLE TO IDENTIFY WITHOUT TOOLS OR REFERENCES

Apiaceae (carrot family)
Apocynaceae (milkweed and dogbane family)
Araceae (aroids)
Arecaceae (palms)
Asteraceae (aster and sunflower family)
Brassicaceae (mustard family)
Bromeliaceae (bromeliads)
Cactaceae (cacti)
Cucurbitaceae (cucumber and melon family)
Cupressaceae (cedar family)
Cyperaceae (sedges)
Ericaceae (blueberry family)
Fabaceae (bean family)
Fagaceae (oak family)
Juncaceae (rushes)
Lamiaceae (mint family)
Lauraceae (laurel family)
Liliaceae (lily family)
Magnoliaceae (magnolias)
Orchidaceae (orchids)
Pinaceae (pine family)
Poaceae (grasses)
Polygonaceae (buckwheat and knotweed family)
Rosaceae (rose and apple family)
Rubiaceae (coffee family)
Solanaceae (tomato, pepper, and potato family)

ADDITIONAL PLANT FAMILIES FOR GRADUATE STUDENTS

Amaranthaceae (amaranth family)
Anacardiaceae (cashew and poison ivy family)
Betulaceae (birch family)
Caryophyllaceae (carnation and pink family)
Euphorbiaceae (spurges)
Juglandaceae (walnut family)
Malvaceae (cotton family)
Moraceae (mulberry family)
Myrtaceae (myrtle family)
Oleaceae (olive and jasmine family)
Ranunculaceae (buttercup family)
Rutaceae (rue or citrus family)
Vitaceae (grape family)

MAJOR PLANT GROUPS THAT EVERYBODY SHOULD KNOW

Lichens (algae plus fungus)
Red algae (Rhodophyta)
Green plants (Viridiplantae)
Green algae ('Chlorophyta')
Land plants (Embryophyta)
Mosses and liverworts (Bryophyta)
Vascular plants (Tracheophyta)
Clubmosses (Lycopodiophyta)
Ferns and horsetails (Monilophyta)
Woody plants (Lignophyta)
Seed plants (Spermatophyta)
Gymnosperms (Gymnospermae)
Conifers (Coniferae)
Flowering plants (Angiospermae)

Table 2. MORPHOLOGY TERMS TO KNOW (*grad students only)

Growth habit
herb
Shrub
tree
liana/vine
epiphyte

Growth duration
annual
biennial
perennial
deciduous
evergreen

Underground structures
root
root hair
primary root/tap root
secondary roots
adventitious roots
fibrous roots*
aerial root*
bulb
tuber
corm*
rhizome
stolon

Stems
bark
lenticel*
growth ring
pith
node
internode
bud
axillary bud
apical bud
bud scale scar*
leaf scar*
thorn
tendril
cladode*
ascicle*
twining
prostrate*
decumbent*

Energy consumption
Autotroph
Mycotroph
Parasite/Saprophyte
Insectivory
Carnivory

Leaves
petiole
blade (lamina)
stipule
interpetoliar stipule
spine
leaflet
rachis*
petiolule

leaf position:
alternate
spiral
whorled
basal rosette

leaf division:
simple
lobed
dissected
compound
pinnately lobed
palmately lobed

leaf venation:
parallel
peni-parallel
pinnate venation
palmate venation
dichotomous*

compound leaves:
pinnately compound
palmately compound
even-pinnate/odd-pinnate*
bipinnate/tripinnate*
pinnatifid*
bipinnatifid/tripinnatifid*

leaf shapes:
ovate
elliptic
oblong
obovate
lanceolate
linear
orbicular (circular)
cordate
acicular
ensiform
peltate
hastate*
sagittate*
perfoliate*

leaf apices/bases:
acute
acuminate
obtuse
truncate
rounded
attenuate*
cordate*
mucronate*

leaf margin:
entire
toothed
crenate
dentate
serrate
revolute*

Inflorescences
bract
bracteoles*
peduncle
pedicel
involucre
phyllary*
receptacle
chaff*

position:
axillary
terminal

inflorescence type:
head
capitulum*
raceme
cyme
monochasium*/dichasium*
spike
umbel
compound umbel
corymb
cyathium*
spadix (& spathe)
catkin
solitary flower
determinate
indeterminate

spikelet
glume*
lemma*
palea*
lodicule*

Flowers & flower parts
perfect (hermaphroditic)
imperfect (unisexual)
monoecious
dioecious
gynoecium*
pistil
ovary
style
stigma
carpel
placenta
ovule
heterostyly*
disk
androecium*
stamen
anther
filament
pollen
staminode*
pedicel
hypanthium
sepals
calyx
tepal
petals
corolla
spur
apetalous
apopetalous
aposepalous
synsepalous
sympetalous

flower symmetry:
actinomorphic (radial)
zygomorphic (bilateral)

flower position:
superior ovary
hypogynous flower*
inferior ovary
epigynous flower*

flower shape:
tubular
campanulate
funnelform
rotate
bilabiate
salverform
cruciate
spurred
urceolate*

Fruits
fruit type:
simple fruit
aggregate fruit
multiple fruit
berry
nut
capsule
drupe
grain
achene
samara
caryopsis
hesperidium
pome
pepo
legume (bean)

fruit opening:
dehiscent & indehiscent
pores (porate*)
fruit placentation:
axile
parietal
free central
basal

fruit parts:
pericarp
apocarpous
syncarpous
seeds
embryo
endosperm
cotyledons
aril
wing

General descriptive terms
round (terete*)
4-angled (quadrangular*)
flattened
angular
winged
adnate*
connate*
pendant
erect

Non-flowering plants
cone
cone scale
needle
strobili*
spore

Non-flowering plants cont'd
sori (sorus)
indusium*
elater*
annulus*
frond
circinate leaves
sporangium
microsporangia
microsporophyll*
megasporophyll*
sporangiophore*
antheridium
archegonium
heterspory/homospory
sporophyte
gametophyte

Special features
gland
nectary
keel
ridge(d)

trichomes:
multi-cellular trichomes
capitate
stellate

texture:
succulent (fleshy)
leathery (coriaceous*)
papery (membranaceous*)
woody
prickly
smooth
hairy
rugose*

Anatomy
crystals
latex
stomata
tracheids
vessels
xylem
phloem