# BIOLOGY 225: LOCAL FLORA, Summer I 2011 Course Schedule

Dr. J. Van Kley  
Lecture: MTWR 12:30-1:30  
Lab: T, TR 1:45-5:30pm  
Room 117, Miller Science Building

<table>
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<th>Week</th>
<th>Lecture Topic:</th>
<th>Laboratory: Locations subject to change.</th>
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| Week 1:  (6/06/11) | - Introduction, plant names  
- Vegetative terminology  
Th) Dry Sandy Upland: (alternate day or No Lab) |
| Week 2:  (6/13/11) | - Vegetation ecology: “Why plants grow where they do”  
- Natural & semi-natural East Texas plant communities  
- Using Keys to identify Plants | T) Dry-upland longleaf pine community & herbaceous seep: Angelina National Forest  
TR) Dry-mesic mixed upland forest: SFA Campus. |
| Week 3:  (6/20/11) | - Collecting plants and the Herbarium  
- Plant classification and evolutionary lineages  
- Ferns and Lycophytes  
- Seed plants: Gnetophytes, Cycads, Ginkgos, & conifers  
- Origin & Classification of Flowering Plants | T) Mesic lower slope & stream-bottom forest: Sabine National Forest  
TR) Forested Seep; Angelina National Forest |
| Week 4:  (6/27/11) | - Flowering Plant Families: Nympaeaceae & Magnoliids  
- Flowering Plant Families: Monocotyledons  
- Flowering Plant Families: Eudicotyledons  
Test 2: (Thur) | T) Field trip to Caddo Lake: 12:00pm; may go later (than 9:00pm) Bald cypress swamps & wetlands  
TR) Seasonally-flooded river floodplain, Regularly flooded swamp: SFA Experimental Forest |
| Week 5:  (7/04/11) | - Holiday (M)  
- Flowering Plant Families: Eudicotyledons (continued) | T) Lab final |

**Final Examination (Friday 7/08/11)**

* Note: With the exception of the first, each lab period will begin with a quiz.*
Text: Illustrated Flora of east Texas vol I (Diggs et al.) 2006, and Illustrated Flora of North Central Texas (Diggs et al.) 1999
(see http://artemis.austincollege.edu/acad/bio/gdiggs/floras.html & click the appropriate links to download FREE!! .pdf copies.

Course Description:
Knowledge of the natural plants and the vegetation around us provides an excellent way to appreciate the natural world. Plant identification skills are also vital to many other botanical and biological fields. Plant ecology, is the study of the interactions of plants with each other and their environment. Wildlife studies, wetland studies, and resource management, and ecology all require the ability to identify plant species.

There is a demand for individuals with knowledge of vegetation and good plant identification skills. For example, most National Forests and Natural Resource agencies hire a field botanist. Wetland delineation, a skill needed by many private environmental consulting firms, involves being able to identify wetland plants.

This course will give you the basic skills necessary to start identifying plants, enable you to recognize many species ‘on sight’ and will introduce you to the various natural habitat types of the East Texas Pineywoods and the plant species that characterize them. The course will also acquaint you with some of the terminology botanists use to identify plants. You will also become familiar with the major vascular plant groups and their evolutionary relationships.

Grading policy and Assignments:
Lecture and lab will each count for 50% of your final course grade. There will be 2 lecture tests and a cumulative lecture final each worth 1/3 of your lecture grade. Weekly lab quizzes and lab exercises, and a lab final will comprise your lab grade (each 'point' earned in lab is equal). I expect that you read assignments prior to the lecture in which they are covered. Come prepared to discuss the material in class. This course requires a large amount of memorization; There is no substitute for daily study. Students are encouraged to collect or photograph plants and to develop flash cards and quiz themselves/each other regularly on species identification, terminology, and plant family characteristics. Students may submit their study collections documenting the plants that were assigned (hardcopy only--preliminary check at each test, final hand-in at lab final). Students will be given bonus points based on the quality and comprehensiveness of their collections or photo albums.

The grade-scale will tentatively be as follows:

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<th>Final Percentage</th>
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<tr>
<td>&gt; 90%</td>
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<td>80 - 89%</td>
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There will be no extra credit assignments in this course. Make-up exams will be allowed only for students with excused absences (Documentation of serious illness or other emergency required).

A student cannot properly prepare for a profession by cheating. The MINIMUM penalty for cheating is a ZERO for the test or quiz in question (see policy A-9.10).

Laboratory field trips
The laboratory section mainly consists of twice-weekly field trips. We will go out in all but violent weather. Be sure to bring rain gear and/or umbrellas if it looks like rain. Many of the sites we visit are wetlands; knee-high rubber boots are recommended. Be prepared for the extreme heat & humidity of the East Texas summer. Wear comfortable, cool clothing and use sunscreen, etc. I will provide a container with ice water & plastic cups on each field trip for which we take vans. You will be responsible for learning each species I show you; in addition to a clipboard for taking notes I strongly recommend that you bring a camera with closeup/macro capability (most newer point-and-shoot digital models suffice) to document the plants you must learn!

Attendance and participation:
Good attendance and active participation in class discussions will encourage me to raise your grade in borderline cases (69, 79, 89). Student evaluations help us improve courses. Therefore participation in the anonymous on line course evaluation at the end of the term is a requirement for the course and those who do not participate will receive a 1% deduction from their final score. Cell phones are disruptive and must be turned off during class.

Internet Resources:
- Nearly all of the species we will see in lab can be found in the Pinewoods Plants Gallery: http://www.fp.sfasu.edu/jamesvankley/
- Descriptions of the natural habitat types we will see along with photos of species typically found there are available at: http://www.fp.sfasu.edu/jamesvankley/Ecotypes/index.htm
- Helpful plant family descriptions, pictures of plants, lecture notes, etc. from a similar course taught at Texas A&M can be accessed at: http://www.csl.tamu.edu/FLORA/biolherb/tamudata.htm
**Miscellaneous**

*Academic Integrity (A-9.1)*

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

**Definition of Academic Dishonesty**

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit. Please read the complete policy at [http://www.sfasu.edu/policies/academic_integrity.asp](http://www.sfasu.edu/policies/academic_integrity.asp)

**Withheld Grades Semester Grades Policy (A-54)**

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

**Students with Disabilities**

To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to [http://www.sfasu.edu/disabilityservices/](http://www.sfasu.edu/disabilityservices/).
Local Flora Families:

1) Pinaceae
2) Magnoliaceae
3) Rosaceae
4) Fabaceae
5) Apiaceae
6) Euphorbiaceae
7) Rubiaceae
8) Lamiaceae
9) Asteraceae
10) Ericaceae
11) Brassicaceae
12) Cactaceae
13) Polygonaceae
14) Arecaceae
15) Cyperaceae
16) Poaceae
17) Junaceae
18) Liliaceae
19) Orchidaceae
1) Pinaceae

Gymnosperm, cone-like reproductive organs, separate ovulate & pollen producing cones, ovules borne on top of cone scale. Woody, needle-shaped leaves, often evergreen.

2) Magnoliaceae

Large, showy flowers, numerous parts, many distinct carpels, flower parts borne on an elongate recepticle. Woody, simple alternate leaves, stipular scar encircles twig.

3) Rosaceae

Five petals and 5 sepals, 10 to many stamens, several to many carpels: distinct or connate. Ovary position variable, but hypanthium well developed. Drupe, pome, and aggregate fruit types common. Herbs or woody plants, leaves often compound.

4) Fabaceae

Legume fruit, 3 flower types (subfamilies). Pinnate or bipinnately compound leaves common.

5) Apiaceae

Small flowers arranged in (compound) umbel, Fruit (2 carpels) splits into 2 halves at maturity. Mostly herbs, Swollen petiole base sheathes stem, leaves often several times compound, fern-like (Parsley, carrot).

6) Euphorbiaceae

Variable flowers, main type consists of tiny staminate and pistilate (naked stamens & pistils) flowers arranged in cuplike structure (bracts) called a cyathium. Herbs or shrubs of dry, warm climates, sometimes succulent. (cactus-like), milky sap often present.

7) Rubiaceae

Small symmetrical flowers, corolla = 4-5 petals fused, stamens adnate to corolla. Herbs (temperate N. America), shrubs, or trees (tropical) with opposite or whorled, simple leaves & prominent stipules.

8) Lamiaceae

Assymetrical, 2-lipped flowers, corollas of 5 connate petals, stamens epipetalous, 2 fused carpels with style from base of ovary, fruit = 4 nutlets. Herbs, square stem, simple opposite leaves, plants aromatic.

9) Asteraceae

Head inflorescence, subtended by a series of scale-like bracts (phyllaries). Tiny florets, asymetrical (rays) or symetrical (disks) with epipetalous stamens, anthers fused into cylinder around style, inferior ovary, Achene fruit. Most widespread & 2nd largest family. Mostly herbs, but habit & leaf arrangement variable.

10) Ericaceae

Large, showy 4-or 5-part flower, petals connate but stamens not epipetalous, corolla often urn or bell shaped, stamens release pollen by apical pores. Shrubs with simple, alternate, sometimes evergreen leaves. Often found in poor, acid soils.
11) Brassicaceae

Four-part (cross-shaped) yellow or white flowers in racemes, petals distinct, 4 long & 2 short stamens, fruit a silicle or silique (2 halves separate, release seeds & leave papery central partition). Herbs with alternate leaves and watery, spicy sap.

12) Cactaceae

Large, showy flowers with many petals & inferior ovary, berry fruit. Stems thick & succulent (water storing), leaves small, scale-like, temporary. Pad-like axillary buds (areoles) usually with a cluster of spines. Found in dry climates, native to the Americas.

13) Polygonaceae

Small flowers in a raceme, achene fruit. Mostly herbs with alternate leaves & jointed stems (swollen nodes) Stipules form a sheath (ocrea) above each node.

14) Arecaceae

Small, 3-part flowers in a huge, many-branched panicle. Large, woody, unbranched (single growth point) monocots with huge pinnately compound or fan-shaped leaves. Leaflets have parallel venation.

15) Cyperaceae

Tiny, perfect or imperfect wind-pollinated flowers, essentially lacking sepals & petals. Each flower subtended by a scale, achene fruit. Flowers arranged in spikelets. Herbs, linear leaves, stems strongly angled, solid between the nodes, sheath closed for most of its length. Many wetland plants.

16) Poaceae

Tiny, usually perfect wind-pollinated flowers, lacking sepals & petals. Each flower subtended by 2 bracts (Lemma & Palea). Flowers in spikelets, each spikelet subtended by 2 bracts (Glumes). Grain (Caryopsis) fruit. Mostly herbs, linear leaves, stems round in cross section, hollow between the nodes, sheath open for most of its length. Most important economic family (Grain crops and livestock grazing).

17) Junceaeae

Tiny, complete 6-part flowers arranged in panicles of heads with capsule fruit. Grass-like herbs, linear leaves, stems wirey & round in cross section. Mostly wetland plants.

18) Liliaceae

Large, Showy, symmetrical, 6-part flowers often arranged in umbels. Sepals often resemble petals, ovary position varies. Herbs with alternate, simple, parallel-veined leaves. Plants perennial, commonly grow from various underground overwintering structures (bulbs, corms, rhizomes).

19) Orchidaceae

Showy, exotic-looking asymmetric flowers with inferior ovary. Lower (lip) petal often has elaborate shape. Highly specialized relationships with pollinators common. Fruit a capsule with many tiny, dust-like seeds. Ground-rooted Herbs (temperate) or epiphytes (tropical forests). Rare in many temperate ecosystems, but the largest number of species of all plant families.
During this course we have primarily been classifying plants taxonomically—on the basis of their presumed genetic (and therefore phylogenetic) relationships. Taxonomic classification is basic to all applications of biological science.

It is also, however, possible to classify plants ecologically—on the basis of their individual roles in the natural ecosystem or on the basis of the types of natural habitats in which they are found.

Since plants do not occur alone in the natural environment, but are dependent on numerous abiotic environmental factors in a given site and are in competition with many other species, such an ecological perspective is important for further understanding the natural world.

In this exercise you will list the species you were assigned to learn in lab for this course under the habitat type(s) in which, according to your observations, each species is most abundant. You may optionally list additional taxa that are not on the assigned list but that you know to be characteristic of certain habitat types. List your species under the following habitat type headings:

1) Dry sandy (non-longleaf) uplands.
2) Longleaf pine uplands.
3) Seepage "bogs".
4) Mesic uplands and mesic creek bottoms.
5) Wet creek bottoms and forested seeps (baygalls).
6) River floodplains.
7) Swamps.
8) Roadsides, fields, lawns and other recently disturbed or early-successional areas. (Generalist species that tend to occur abundantly in nearly all habitats can also be listed here).

Your lists should be presented in the above order and must be neat and legible. I prefer that they be typewritten, but exceptionally neat handwritten lists will be acceptable.

While some species occur across only a narrow range of habitats, many species are found on a rather broad range of sites and may be found on a number of the above habitat types. Your challenge is to list a species under the habitat type(s) in which it is most abundant. You may not list any species under more than 3 habitat types. Try not to list most species more than twice.

The exact ecological preferences of most of these species is not yet fully known; there is not a single "right" answer for this exercise. In grading this exercise I will consider whether or not your classification is logical, not whether it conforms to a pre-existing "right" answer.
I) Matching: match the plant family with the statement that best describes it  (2 points each)

____1) Ericaceae  
a) Large, Showy, symmetrical, 3-sepal, 3-petal flowers often arranged in umbels. Herbs with alternate, simple, parallel-veined leaves. Plants grow from bulbs, corms, or rhizomes.

____2) Cactaceae  
b) Water plants with 3 white petals, many stamens and many distinct carpels. Believed to be one of the more primitive monocot families.

____3) Orchidaceae  
c) Small flowers in a raceme, achene fruit. Mostly herbs with alternate leaves & jointed stems with swollen nodes. Stipules form a sheath (ocrea) above each node

____4) Alismataceae  
d) Tiny wind-pollinated flowers, each flower subtended by a scale. Flowers arranged in spikelets. Herbs, linear leaves, stems angled, solid between the nodes, sheath closed. Many wetland plants.

____5) Liliaceae  
e) Small, 3-part flowers in a large, many-branched panicle. Large, woody, unbranched monocots with huge pinnately compound or fan-shaped leaves. Leaflets have parallel venation.

____6) Poaceae  
f) Showy 4-or 5-part flower, stamens not epipetalous, corolla often urn or bell shaped. Shrubs: simple, alternate, evergreen leaves. Often found in poor, acid soils. Blueberries.

____7) Brassicaceae  
g) Large, showy flowers with many petals & inferior ovary, berry fruit. Stems thick & succulent, leaves small, temporary. Axillary buds (areoles) usually with a cluster of spines. Dry climates.

____8) Polygonaceae  
h) Showy, asymmetric flowers, inferior ovary. Elaborate-shaped lip petal. Highly specialized pollinator-relationships. Fruit a capsule. Ground-rooted Herbs (temperate) or epiphytes (tropical).

____9) Arecaceae  

____10) Cyperaceae  
j) Four-petaled (cross-shaped) flowers in racemes, 4 long & 2 short stamens, fruit a silicle or silique. Herbs with alternate leaves and watery, spicy sap. Mustard & broccoli.

II) Essays: Answer on a separate sheet of paper (5 points each).

1) Describe the inflorescence, flower, and vegetative features of the Poaceae

2) Describe the floral and vegetative features of the Bromeliaceae. Name the three subfamilies and describe how they differ with respect to the ovary position of their flowers and their growth habit.

3) Describe the floral and vegetative features of one of the following families.

   a) Fagaceae   b) Cactaceae   c) Orchidaceae
III) List at least five species that are characteristic of each of the following East Texas habitat types. Try to list species that are dominant or are good indicators of the site rather than just species that may happen to grow there (5 points each).

1) Dry sandy uplands

2) Dry and Dry-mesic upland longleaf pine communities

3) Dry-mesic mixed pine/hardwood upland forests

4) Mesic lower slopes and creek bottoms

5) Wet-mesic stream floodplains

6) Forested seeps or wet creek bottoms

7) Herbaceous seeps (pitcher plant seeps)

8) Bottomland hardwood communities (river floodplains)

9) Swamps and other wetlands

10) Human-influenced (disturbed) sites: roadsides, pastures, abandoned fields, mown areas, and edges.
Part 2: Cumulative final exam:

I) Fill in the blank with the correct answer (2 points each)

_______________ 1) The science of naming, classifying and identifying plants is called __?
_______________ 2) A plant in which 2 leaves are attached at each node is said to have ___ leaf arrangement
_______________ 3) The term describing the shape of an egg-shaped leaf < 3 times longer than broad, broadest toward the tip is ____?
_______________ 4) A leaf or flower that does not have a stalk, but attaches directly to the stem is ____.
_______________ 5) A pistil is composed of one or more ovule-bearing appendages called ___.
_______________ 6) When the other flower parts attach above of the ovary, the ovary position is ___.
_______________ 7) The term describing when flower parts of the same series are fused together is ___.
_______________ 8) the term describing when flower parts are fused to parts from different series (eg. Stamens fused to petals) is ___.
_______________ 9) A flower that has all four series of parts is said to be __.
_______________ 10) A flower that lacks either a pistil or stamens is said to be __.

II) Matching: match the plant family with the statement that best describes it  (2 points each)

___1) Rosaceae  A) Small flowers arranged in (compound) umbel, Fruit (2 fused carpels) splits into 2 halves at maturity. Herbs, expanded petiole base sheathes stem, leaves compound, fern-like (Parsley, carrot).
___2) Fabaceae  B) Small symmetrical flowers, (4-5 fused petals), stamens adnate to corolla. Herbs (N. America), shrubs or trees (tropical) with opposite or whorled, simple, stipulate leaves. Coffee.
___4) Rubiaceae D) Legume fruit, many important food plants (beans peas, soybeans).
___5) Magnoliaceae E) Ovules borne naked on the scales of a woody cone. Bracts subtending scales not adnate to scales. Leaves needle like, alternate, or in bundles on spur-shoots. cones ovate in shape.
___6) Lamiaceae F) Five petals, 10 to many stamens, Ovary position variable, hypanthonium well developed. Drupe, pome, & aggregate fruit types. Herbs or woody plants, leaves compound. peaches.
___8) Pinaceae H) Asymmetric, 2-lipped flowers, 5 connate petals, stamens adnate to corolla, 2 fused carpels with style from base of ovary. Herbs, square stem, simple opposite leaves, aromatic.
___9) Apiaceae I) Ovules borne naked on the scales of a woody cone. Bracts subtending scales adnate to scales. Leaves needle like or scale-like, alternate. cones globular (round) in shape.
III) Multiple Choice: Select the best answer (2 points each).

1) Members of the Rosaceae generally are
   a) woody plants.  
   b) herbaceous plants
   c) The family includes both woody & herbaceous members

2) Angiosperms (flowering plants) are believed to have originated
   a) in the early Cretaceous (130-135 Million years ago).      
   b) in the Silurian (440 Million years ago).                
   c) in the Pleistocene (20,000 years ago).                  
   d) in the Cambrian 600 Million years ago.

3) The flowering plant subclass that contains Magnolias, sassafras, laurels and water lilies, and is characterized by primitive, perfect flowers with numerous stamens & numerous distinct carpels is the
   a) Dilliniideae  b) Caryophyllidae  c) Asteridae  e) Magnoliidae.

7) The subclass that contains mints, sunflowers and asters, and is considered to be one of the most advanced subclasses is the
   a) Dilliniideae  b) Caryophyllidae  c) Asteridae  e) Magnoliidae.

8) One of the vegetative features of the Magnoliaceae includes a stipular scar that encircles the twig at each node.
   a) true   b) false  c) true only for genus Magnolia, but not the rest of the family.

9) What is the characteristic inflorescence of the Apiaceae?
   a) head  b) spike  c) compound umbel.  d) raceme

10) Fabaceae that are woody plants and have symmetrical flowers with long, protruding stamens that are arranged in heads belong to the subfamily
    a) Paplionoideae (=Faboideae).  b) Ceasalpinioideae.  c) Mimosoideae.

11) Fabaceae that are woody plants and have asymmetrical (zygomorphic) flowers with the uppermost petal inserted inside of the two side petals and two lower petals that are not connate (fused) belong to the subfamily
    a) Paplionoideae (=Faboideae).  b) Ceasalpinioideae.  c) Mimosoideae.

12) Fabaceae that are either herbaceous or woody plants and have asymmetrical (zygomorphic) flowers with the uppermost petal (“banner”) inserted outside of the two side petals, two lower petals that are connate (fused) to form a “keel”, and stamens where 9 are connate by the filaments and one is distinct belong to the subfamily
    a) Paplionoideae (=Faboideae).  b) Ceasalpinioideae.  c) Mimosoideae.

IV) Short essay Questions: (5 points each)

1) Briefly describe (one brief phrase per category): an upland longleaf pine community.
   a) topographic position 
   b) soil and hydrologic conditions
   c) vegetation (list a few diagnostic species, common names OK)
   d) What important factor prevents competing woody species from taking over the site?

2) Finishing your Local Flora class, you decide to unwind after this incredibly stressful experience by taking a vacation in the Davis Mountains of far west Texas. Your route takes you from Nacogdoches to Bryan-College Station and then to Austin. From Austin you get on Interstate 10 and head west to Ft. Davis. List the major vegetation areas of Texas you encounter along your trip (don’t list any that you do not pass through). What is the main climatic factor that causes the dramatic differences in vegetation that you will see along this east-to-west trip?

3) Describe the inflorescence, flower, and vegetative features of the Asteraceae.
July 10, 2001

Dear Dr. Hay,

As of the third day of class (July 10, 2001) the Summer II local Flora (Biology 225) class is still under-enrolled by one student (10 were enrolled on 7/09/01, but one did not show up and subsequently dropped). However, there are several students, Emily Talbert, Lakesha Demings, Rina Mondragon, Douglas Crawford, and Seth Rodwald-Bates who are in their final semester and need this course to graduate. Therefore I would like to request permission to teach Local Flora as an under-enrolled class.

Sincerely,

James Van Kley

IN THE END WE MADE WITH 10 STUDENTS!!! YEA!!! All stuck with it to the end, all passed!!!!
1) **Conifers** (Pinophyta)

1) *Cupressaceae*: Gymnosperm, woody plants, Scale-like to short needle-shaped leaves, often evergreen. Cone-like reproductive organs (strobili), separate ovulate & pollen producing cones. Ovulate cone globular, woody (fleshy at maturity in *Juniperus*), 2-many ovules borne on each cone scale, and bracts subtending cone scale adnate to scale.

2) *Pinaceae*: Gymnosperm, woody plants, needle-shaped leaves, often evergreen. Cone-like reproductive organs (strobili), separate ovulate & pollen producing cones. Ovulate cone elongate & woody, 2 ovules borne on top of cone scale, bracts subtending cone scale free.

2) **Flowering Plants** (Magnoliophyta)

**A) Magnoliids & Nymphaeids**

1) *Magnoliaceae*: Large, showy flowers, numerous parts, many distinct stames & carpels, flower parts borne on an elongate recepticle. Woody, simple alternate leaves, stipular scar encircles twig.

2) *Nymphaeaceae*: Small group of floating or submersed aquatic plants. Showy flowers with many parts. Large round leaves in floating members. Sister group to the main lineage of flowering plants.

**B) Monocotyledons**

1) *Alismataceae*: Aquatic monocots with simple basal leaves, flowers with 3 white petals, many stamens and many distinct carpels.

2) *Amaryllidaceae*: Large, showy, symmetrical flowers, 3-sepals, 3 petals. Sepals often resemble petals, ovary inferior, 3 connate carpels. Herbs with alternate, simple, parallel-veined leaves. Plants perennial, commonly grow from various underground overwintering organs such as bulbs.

3) *Smilacaceae*: Woody vines with simple, alternate leaves with palmate venation and prickly stems. Symmetrical imperfect flowers with 3 sepals & 3 petals. Pistilate flowers have a superior ovary. Related to lilies.

4) *Arecaceae*: Small, 3-part flowers in a large, many-branched panicle. Large, woody, unbranched (single growth point) monocots with large pinnately compound or fan-shaped leaves. Leaflets have parallel venation.

5) *Cyperaceae*: Tiny, perfect or imperfect wind-pollinated flowers, essentially lacking sepals & petals. Each flower subtended by a scale, achene fruit. Flowers arranged in spikelets. Herbs, linear leaves, stems strongly angled, solid between the nodes, sheath closed for most of its length. Many wetland plants.

6) *Juncaceae*: Tiny, complete, wind-pollinated flowers, with 3 sepals 3 petals arranged in heads or panicles. Fruit a capsule. linear leaves, stems round in cross section, mostly wetland plants.

7) *Orchidaceae*: Showy, exotic-looking asymmetric flowers with inferior ovary. Lower (lip) petal often has elaborate shape. Highly specialized relationships with pollinators common. Fruit a capsule with many tiny, dust-like seeds. Ground-rooted Herbs (temperate) or epiphytes (tropical forests). Rare in many temperate ecosystems, but the largest number of species of all plant families.

8) *Poaceae*: Tiny, usually perfect wind-pollinated flowers, lacking sepals & petals. Each flower subtended by 2 bracts (Lemma & Palea). Flowers in spikelets, each spikelet subtended by 2 bracts (Glumes). Grain (Caryopsis) fruit. Mostly herbs, linear leaves, stems round in cross section, hollow between the nodes, sheath open for most of its length. Most important economic family (Grain crops and livestock grazing).
C) Eudicotyledons

Caryophyllids & Others

1) Cactaceae: Showy flowers with many petals & inferior ovary, berry fruit. **Stems thick & succulent** (water storing), leaves small, scale-like, temporary. **Pad-like axillary buds (areoles)** usually with a cluster of spines. Found in dry climates, native to the Americas.

2) Polygonaceae: Small flowers, often arranged in a raceme or spike-like cluster, achene fruit. Mostly herbs with **alternate leaves & jointed stems** (swollen nodes). Stipules form a **sheath (ocrea) above each node.**

3) Ranunculaceae: Mostly **herbs** (some vines). Leaves often compound or divided in threes, stipules lacking. Flowers perfect, often with yellow or white petals, **numerous stamens & 3- numerous distinct carpels.**

Rosids

4) Euphorbiaceae: Variable flowers, main type consists of **tiny staminate and pistilate (naked stamens & pistils) flowers arranged in cuplike structure (bracts) called a cyathium.** Herbs or shrubs of dry, warm climates, sometimes succulent (cactus-like), **milky sap** often present.

5) Fabaceae: **Legume fruit**, 3 flower types (subfamilies). Pinnate or bipinnately compound leaves common.

6) Fagaceae: **Important temperate forest trees**, alternate simple leaves & small, imperfect flowers. Staminate flowers in catkins, pistillate flowers in small clusters. Fruit a **nut subtended by a bur-like or cup-like involucre**

7) Juglandaceae: Temperate forest trees with alternate, pinnately compound leaves. Small, imperfect flowers, fruit a nut covered by a husk. Economically important as furniture lumber and a nut-producers (pecan, walnut).

8) Rosaceae: Five petals and 5 sepals, 10 to many stamens, several to many carpels: distinct or connate. Ovary position variable, but **hypanthium well developed. Drupe, pome, and aggregate fruit** types common. Herbs or woody plants, leaves stipulate, often compound.

Asterids

9) Apiaceae: Small flowers arranged in **(compound) umbel**, Fruit (2 carpels) **splits into 2 halves at maturity.** Mostly herbs, **Swollen petiole base sheathes stem**, leaves often **several times compound**, fern-like (Parsley, carrot).

10) Asteraceae: **Head inflorescence**, subtended by a series of scale-like bracts (phyllaries). **Tiny florets, asymmetrical (rays) or symmetrical (disks)** with epipetalous stamens, **anthers fused into cylinder** around style, **inferior ovary, Achene** fruit. Most widespread & 2nd largest family. Mostly herbs, but habit & leaf arrangement variable.

11) Lamiaceae: Asymmetrical, 2-lipped flowers, corollas of 5 connate petals, **stamens epipetalous**, 2 fused carpels with **style from base of ovary**, fruit breaking apart into 4 nutlets. Herbs, **square stem, simple opposite leaves, plants aromatic.**

12) Rubiaceae: Small symmetrical flowers, corolla = 4 -5 connate petals, **stamens adnate to corolla.** Herbs (temperate N. America), shrubs, or trees (tropical) with **opposite or whorled, simple leaves & prominent stipules.**
Week 1:
(5/30/07-W)
No Lab

Week 2:
T) No vans needed: Human-dominated communities: Campus.
(6/4/07)
TR) 6/7/07 Local: Dry upland & forested seep: Naconieche Creek*.

Week 3:
T) 6/12/07 Zavalla, TX: Dry-upland longleaf pine community
(6/11/07)
& herbaceous seep: Angelina National Forest
TR) 6/14/07 Local: Dry-mesic mixed upland forest: SFA Exp. Forest

Week 4:
T) 6/19/07 San Augustine, TX: Mesic lower slope & stream-bottom forest: Sabine
(6/18/07)
National Forest.
TR) 6/21/07 Local: Wet-mesic floodplain forest, Seasonally-
flooded river floodplain, water-elm swamp: Angelina R.

Saturday 6/23/07, Uncertain, TX: All-day Field trip to Caddo Lake
(may go later than 6:00pm)
Cypress swamps & riverine wetlands

Week 5:
T) Lakeside wetlands: 6/28/07 Center, TX Pinkston Lake
(6/25/07)