Cover Page: Gerald and Deanne Gitner Excellence in Teaching Award

Nominee:
Dr. Amy Zanne
Assistant Professor
Department of Biology
University of Missouri - St. Louis
S448 Stadler Hall

Nominator:
Dr. Peter Stevens
Professor and Chair
Department of Biology

Checklist:

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Letter of support Chair

P. F. Stevens
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Selection Committee,
Gerald and Deanne Gitner Excellence in Teaching Award,
University of Missouri

17.iv.2010

It is a great pleasure to be able to nominate Dr Amy Zanne for the Gerald and Deanne Gitner Excellence in Teaching award. Amy is an Assistant Professor in the Department of Biology and has been here less than two years, but she is breathing life into the courses she is teaching, both her higher level courses but also the lower level course that she is teaching that had got rather stale over the years. In addition, she is a great colleague to have, enthusiastically participating in general departmental discussions and active in department committees (including efficiently chairing the Student Award Committee).

Her general approach to teaching is that of fostering community among students, so the class becomes less a teacher with students, but more interactions between a group of colleagues. That is not to say that she does not have clear goals for her classes, but by the way she structures her course, she is able to listen as well as (tactfully) prescribe. It is fun to teach the odd lecture in her courses, as I did once when she had to be away. The students were without exception interested, all had done the necessary reading before class, and all (really!) participated in the discussion. She sees that it is important to get students to think about what it means to be a scientist, and how the presentation of a scientist's ideas is a critical component of being an effective scientist. So in her senior seminar she has the students writing a letter to a grandparent explaining particular environmental issues, thinking about biology and society, as well as about their own future careers in biology.

Amy is not afraid to introduce mathematics into her classes, for instance, in a higher-level course she introduced students to R, a very powerful analytical tool, much appreciated by students (see letters). This was effective partly because she had her class work through real problems, and also because of her use of a Wiki site. In another course she used Zotero, which

enabled the class to produce a general bibliography – and one class member from Bolivia noted that this would be very valuable resource for her when she went home. Indeed, classes do not stop when the bell rings, because the teaching aids she has developed are a permanent resource for the students, indeed, they can build further on them.

She is also a co-founder (with a faculty member from St Louis University) and maintains the St Louis Ecology and Evolutionary Biology Google group website which has given the scattered St Louis organismal biology group a sense of identity it did not have – perhaps not surprisingly, students from both Washington University and St Louis University attend her classes. Even in her first term, she actively involved University of Missouri-St Louis undergraduates in research activities, and these students – I have talked with several on unrelated matters – were clearly both enjoying themselves and learning a great deal. She is also a effective mentor for graduate students.

Finally, I should point out that much of her research is collaborative in the best sense – and Amy is the facilitator of these collaborations. Her work also involves building data bases that are used in her own research and are also available to other biologists, who can also add data. This is not unlike her reaching, because again we see her interacting with colleagues, leading by example, and building up resources for the community that have a life well beyonf the project in hand – indeed, they are permanent.

There is a pattern here: Amy is continually striving to develop and facilitate the ability of established scholar and student alike to think, and providing them with the resources to do it. She surely is worthy of the Gerald and Deanne Gitner Excellence in Teaching award.

P. F. Stevens

Professor of Biology and Chair, Department of Biology.

Letter of support Dean

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April 23, 2010

Selection Committee
Gerald and Deanne Gitner Excellence in Teaching Award
University of Missouri

This letter is in support of the nomination of Dr Amy Zanne for the Gerald and Deanne Gitner Excellence in Teaching Award.

What makes Dr Zanne's case so compelling is the way she blends old-fashioned care of the

students with her use of wikis and other state of the art communication protocols to provide a truly first rate learning environment. Almost from the first day of her arrival here, her room has seemed to be perpetually occupied by students working on research projects with her or simply talking about biology. In her more formal teaching she aims to break down the barrier between teacher and student, the more effectively to teach concepts and techniques that are, quite frankly, hard – yet which a first-rate student needs to master if s/he is to function effectively as a biologist in the twenty first century. But for Amy, education does not end in the classroom, and it is the bibliographies that her students build and the permanent wikis that she sets up that enables students to cumulate their knowledge in a remarkably effective way – it is almost as if they never leave class. A number of our higher-level students are from other countries, and these students in particular appreciate the value of this kind of education.

If Amy's students never leave class, one could equally well say that Amy herself never stops teaching, because much of her work is collaborative in the best sense – just as teaching and learning is. An integral part of her research is developing public access databases and the like for both her own use and that of other biologists – again, knowledge cumulates. Amy is active in the Department in facilitating a change in direction of the undergraduate biology curriculum to a more environmental and ecological focus, and was chosen to chair the Awards Committee this year.

All in all, this is a truly meritorious nomination which I am delighted to support.

Sincerely,

Ronald E Yasbin
Dean and Professor of Microbiology

Teaching philosophy:

As an ecologist and evolutionary biologist also interested in applied issues, I feel it is my duty to be a strong teacher, a duty that I greatly enjoy. It is of utmost importance to share my knowledge of approaches to investigating biological systems, as well as the functioning of and threats to those systems. I strongly believe in committing to graduate training both in and outside of classrooms by providing them not only with skills to think and question but also to apply these questions to actual solutions. These solutions are often dependent on being technically savvy or experienced in completing a task (e.g., statistical analyses, manuscript review process, bibliographic databasing, research databasing). Additionally, the onus on the biologist should not only be to collect and share our research within the scientific community but also to share it with the general population. One of our best opportunities is to influence undergraduate education. This dual drive of basic and applied interests has spurred me to teach students at a variety of levels and situations. In my teaching, I have several goals, including skill and resource building, fostering a community of intellectual peers, and making information accessible to a broad range of students in a variety of formats.

Skill and resource building: Providing students with new skills and resources is an important job for teachers. I do not believe it is sufficient to just pass along information to students. I hope that students upon finishing my classes have new ways to view and process information. In each of my classes, I have tried to select a series of skills or applications that I feel would be useful to the students. These skills range from learning how to develop questions/experiments to the nuts and bolts of how to run statistical analyses.

Most recently, I have been teaching a graduate special topics course, Comparative Structure and Function and Analyses in R (CSFAR). When speaking to graduate students before

this semester, it was clear that they while UMSL offered courses discussing data analysis, no courses offered hands-on approaches to analyzing biological data. Importantly no classes were being taught using the powerful statistical program R (http://cran.r-project.org/). This program is state-of-the-art and the most broadly used for statistics and graphics in biology today. However, it is also a challenge as it is command line, in that the users must write code to analyze their data. I believe that command-line is especially useful as it forces users to understand how different analyses run. Additionally no one in the St. Louis area was offering courses for analyzing data comparing organisms based on their evolutionary relationships (phylogenetic comparative analyses). Furthermore, no one in St. Louis was teaching courses that relate organism-based questions exploring how organisms function (ecophysiology), especially in relation to their anatomical/morphological design (structure). In my research, I explore how the stems and leaves of plants are built and how those differences allow them to grow in different environmental settings. I explore these questions at local to global scales and within the context of the plants' evolutionary backgrounds. I frequently depend on the program R. I put together the CSFAR course based on identified student needs as matched to my research background. I recognize that one seldom learns a new way to ask questions, unless it is in the context of one's own research. I have asked students to identify a data analysis problem in their own research and learn how to run those analyses. The students must then design an exercise and write code that they present to they rest of the class. All presentations and code are posted to a stable wiki site (http://www.phylodiversity.net/azanne/csfar). The benefit of this wiki is that students can continue to add to and rely upon the course material well past the end of the course.

In past classes, I have also identified different tools needed. For instance, I realized that many graduate students were not making use of bibliographic databasing programs. In my

graduate seminar last semester, I had students give a presentation and turn in an annotated bibliography on a particular topic related to organisms' phenotypes (traits). I created a shared course bibliographic library in Zotero (http://www.zotero.org/). All articles from the semester are posted to this site and can be accessed in the future by any of the students.

In my undergraduate courses, I know that some of my students will go on in biology and must understand fundamental principles. Throughout my lectures, I give them parts of the information but then pause and make them discuss and answer questions about the topics. I do this by using frequent examples from my own research. I also recognize that many of my students will focus on other disciplines in their future careers. As members of society and voters, if these students have a strong understanding of biology, they can help to educate those around them. In all of my undergraduate courses, I have had them read and report on biology or ecology in the news. They have to describe to other students the science behind the news article. I have also had them write letters to grandparents trying to explain different angles of a local environmental issue. Or, I have had them becoming practicing ecologists by keeping a journal for a tree as it goes through its fall foliage changes. For this journal, I ask them to relate changes in the tree to changes in the environment. Most recently, for my senior seminar, I have had a series of four workshops, in which we discuss their future career paths and how to attain their career goals. We have focused on applying to graduate schools, writing CV's and resumes, and asking for letters of recommendation.

Finally, in my 20+ months at UMSL, I have mentored 7 undergraduates, 4 PhD students, and 1 MSc student in my lab. I hold weekly meetings with my students, as well as lab meetings. Many of these lab meetings have focused on gaining particular skills. For example, we have

covered topics on how to review a journal manuscript, how to move from databasing in Excel to MySQL, and how to run Environmental Niche Factor Analysis.

Fostering a community of intellectual peers: While I am the main instructor in each of the classes I teach, as well as head of my laboratory, I believe that it is important that information does not just flow from me to my students and mentees. Instead, I try to foster and build a group of colleagues. These colleagues can teach and learn from one another and I can learn from them. I have been cultivating a broader St. Louis community by developing (with Dr. Allison Miller from SLU) and maintaining myself a Google group website for St. Louis Ecology and Evolutionary Biology (http://groups.google.com/group/st-louis-ecology-and-evolutionary-biology). The focus of this site is to better communicate available courses, workshops, and seminars occurring in St. Louis. This had lead to students from both SLU and Wash U learning about and taking my two graduate courses.

In the CSFAR course, I have students leading discussions on manuscripts related to organisms' structure and function, as well as leading presentations on different statistical tools relevant to their own research. These presentations force students to develop analytical solutions to challenging research problems. What I have found most exciting is that through the semester students are building on one another's analyses and are giving suggestions, comments, and help to one another to solve roadblocks they are encountering. I can see that the Analyses in R part of the course has now built a group of peers who will continue to help one another and share code beyond the end of the class.

In similar ways, in my undergraduate and graduate classes, I have also depended heavily on student presentations and feedback. For instance, in my senior seminar, all students supply anonymous feedback to the student presenter. And, in my graduate seminar class, students lead

discussions on topics based on their own questions and questions that other students have previously submitted on a manuscript everyone reads.

Making information accessible to a broad range of students in a variety of formats: Within the classroom setting, I think it is of utmost importance to facilitate learning using a variety of methods as each student learns in a slightly different way. I try to combine verbal, written, and visual portrayal of concepts. I also encourage students to ask questions and challenge material presented both within and outside of the classroom. Such a setting facilitates students' abilities to present their ideas, as well as think critically about the material presented. I believe it is necessary when evaluating students to do so in a variety of ways (oral and written) that can highlight their various strengths. It is especially important to develop students' written skills, in addition to their test taking abilities. In all of my classes, I have written assignments, including essay questions on exams. I also have students give presentations in all of my classes, so that they can learn to be articulate when standing up in front of a group of peers. I try to use a wealth of examples and provide materials that are readily accessible online. For my graduate courses, this has lead to the development of class wiki sites allowing long-term curation of materials.

In summary, by providing new tools and skills in a variety of forms and fostering a community of peers, I believe I am building students who are better equipped as scientists, biologists, and biologically savvy members of society. They can both teach and learn from one another. I have made sure that I am meeting my mark for these goals by frequently soliciting feedback on how the course is running. In fact, in all of my classes, I begin by asking if they have any questions or comments about the previous class or about the class more broadly.

Biology 6920 (Special Topics: Comparative Structure and Function and Analyses in R)
Spring 2010

Class meetings: Mondays and Wednesday, 11:00 AM – 12:15 PM, Monday classes Benton 116, Wednesday classes Benton 225 (unless we have enough laptops to switch to B116)

Instructor: **Dr. Amy Zanne**
B.A., Biology, Dartmouth College, Hanover, NH.
M.Sc., Plant Ecology, University of Florida, Gainesville, FL.
Ph.D., Plant Ecology, University of Florida, Gainesville, FL.
Research Interests: Plant evolutionary biology and physiological ecology.
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Office Hours: Directly following class in S448 Stadler or by appointment. For appointments, please schedule in advance by email, phone, or in person.

Course guide: In this class, we will focus on the economy of how organisms are built, investigating trade-offs and coordination in design. We will then investigate how this variation in structure influences physiological function. Most such considerations of comparative structure and function across taxa are useful against the background of the evolutionary history of taxa being considered. We will spend time learning and employing phylogenetic comparative analyses. Additionally, the different structures we cover will be based on selecting evolutionary structural/anatomical innovations and relating these innovations to phylogenetic trees. The course will be broken down into three parts: short lectures and student-led discussions on Mondays, and hands-on use of statistical analyses with the package R on Wednesdays. Students will be responsible for learning and presenting on different statistical techniques in R. The goal will be to develop a packet of materials by the end, including code and how to interpret output from analyses. Due to my background, the lectures will utilize examples predominantly from plants, however students are expected to lead discussions and apply concepts during lectures, discussions, assignments, and data analyses to a broad array of taxa.

Course wiki: http://www.phylodiversity.net/azanne/csfar/index.php?title=Main_Page

Attendance: Class attendance is essential and required.

Academic Honesty: Plagiarism is the use of another's words or ideas (even your own published work) without crediting that person. Academic dishonesty, including plagiarism, cheating, or sabotage will not be tolerated and will lead to a grade of **zero** on that assignment. Students at the University of Missouri-St. Louis are expected to exhibit the highest standards of academic integrity. An act of academic dishonesty is an offense against the university. For that reason, university rules prescribe disciplinary as well as academic consequences for academic dishonesty. The complete campus policy on academic dishonesty can be found at http://www.umsl.edu/studentlife/dsa/student_planner/policies/conductcode.htm .

Disabilities: Students requiring special accommodations should discuss these with me as soon as possible. Prior to meeting with me, you should contact the Disability Access Services Office in 144 Millennium Student Center at 516-5228.

Course Outline: Note this outline is subject to modification throughout the semester.

Week		Monday	Wednesday
1	18-Jan	*No class: MLK holiday*	Introduction to class
2	25-Jan	**Vascular transport, mechanical support, storage:** Stems (including vascular pathways, growth forms, woody/herbaceous)	Introduction to R
3	1-Feb	*Class canceled*	*Class canceled*
4	8-Feb	**Energy acquisition, vascular transport, and gas exchange**: Leaves (including venation, shape, sclerophylly, broad/needle, other photosynthetic structures) – *Peter Stevens*	Inputting and manipulating data
5	15-Feb	**Energy acquisition and biochemical pathways:** Photosynthetic pathways (C3, C4, CAM)	Inputting and manipulating data
6	22-Feb	**Nutrient and water acquisition and anchorage:** Roots (including architecture, cluster, gas exchange, contractile)	Other analyses: GLM, SMA, GLMM, Quantile regression
7	1-Mar	**Symbioses:** (including mycorrhizae, N-fixing, endophytes)	Other analyses: GLM, SMA, GLMM, Quantile regression
8	8-Mar	**Reproduction and attracting mates:** Flowers (including zygomorphy, pollination, flowering time), **SHORT PAPERS DUE**	Multivariate analyses: Ordination
9	15-Mar	**Dispersal of individuals in space:** Fruits, seeds (including size, endosperm, associations with dispersers)	Multivariate analyses: Ordination
10	22-Mar	**Juvenile stages and development:** Gametophytes (including timing of pollen growth on the stigma)	Graphing
11	29-Mar	*Spring break*	*Spring break*
12	5-Apr	**Phylogenetic comparative trait and community analyses**	Graphing
13	12-Apr	**Genomes:** (including duplication, polyploidy)	Phylogenetic comparative analyses: Traits
14	19-Apr	**Communities, biogeography, and selective forces:** Flora (including NZ	Phylogenetic comparative analyses: Traits

		flora and moa herbivory)	
15	26-Apr	**Whole organism:** (including Gnetum)	Phylogenetic comparative analyses: Communities
16	3-May	**Defense:** (including spikes and chemicals)	Phylogenetic comparative analyses: Communities

Expectations and assignments:
Mondays: We will focus on links between structure and function by selecting links that show interesting evolutionary innovation. For my lectures (10-20 minutes), I will select innovations across the plant phylogeny but I encourage you to select topics (for your paper discussion and for your short paper) from any taxa, as long as it shows evolutionary innovation in structure leading to differences in function.

Assignments:
1. Select a paper, post question(s), and lead a class discussion following a brief introduction to your topic **(Due: Paper and questions posted 1 week in advance)**
2. Write a short paper on a topic of your choice **(Due: 8 March in class)**
3. Participate in class by reading the papers and posting questions to the course wiki before class **(Due: Questions posted to the wiki by 9 am before class, ideally sooner)**

I strongly encourage you to **meet with me** before your paper discussion to check on the theme and paper you are selecting, as well as topic for your paper.

Description of assignments:
1. **Discussion:** Each student will be responsible for **selecting a paper** related to that class' theme (apply the theme broadly or let me know if your topic of interest does not seem to be on the syllabus e.g., having a brain, sensing the environment), **pose questions(s)**, give a **short summary** of your topic, and **lead a discussion** (~1 hour) on that paper. You can choose to run the discussion as you see fit (e.g., some combination of the entire class together, small break-out groups, panel debates, etc.). To facilitate this, you should pose one or more questions to help focus class discussion. These questions and the paper should be posted on the course wiki **one week before** the papers are discussed. You should begin your discussion by briefly describing your broad topic, evolutionary innovation, where in the phylogeny this innovation occurs, and why this paper is representative of that innovation.
2. **Short paper:** You will also be expected to write a **short paper due on 8 March** (3-5 pages) on a particular evolutionary innovation in structural design. The topic can, but does not have to be, the same as your paper theme. Your paper should:
    a. Briefly and generally introduce your topic;
    b. Describe where in the phylogeny your innovation occurred;
    c. Describe what the evolutionary innovation in structural design is, comparing this design to closely related taxa who lack these evolutionary shifts;
    d. Explain how the shift in design allowed the taxa to function differently (or perhaps in the same way but via different means);
    e. End with your assessment, explaining in what scenarios taxa having the evolutionary innovation are better off than taxa that lack this innovation (Are taxa

with that innovation more competitive in certain settings? Or might it just be a different way to do the same thing?);

f. You should include at least **8 references**. You will need to include both inline citations and a bibliography section formatted for a standard journal in ecology and evolution. I strongly encourage you to add inline references and build your bibliography using a reference manager. Last semester we used Zotero (http://www.zotero.org/) and it worked very well. If anyone wants to schedule time to see how this works, let me know.

3. **Participation and question:** Class attendance is mandatory. Class **participation** is a large component of the course. Besides participating in class discussions, this participation includes **posting at least one question** for that week's paper to the class wiki ahead of time (by 9 am before class).

Wednesdays: We will focus on statistical analyses using the program R. I have divided up the class into 6 topics over 12 weeks and we have more than that enrolled in the class so 2-3 people will likely work on each topic. Each person is expected to contribute to all parts of the project.

To assist you in preparing for the class you will lead, I have posted a large number of links on the course wiki. Please add to these. Also, from my own library, I have a reasonable collection of books available for you to use. These will be placed in Bob Ricklefs' library. Please use them in the library. If you want to take a book out to photocopy, please sign it out and immediately return it in case someone else needs it. You are expected to lead a class by:

Assignments:

1. Giving a presentation about that topic (20-30 minutes allowing for questions as we go along);
2. Finding (from the literature, a friend, one used in an earlier week, one of your own, or something you make up) a dataset;
3. Developing a class exercise to run the analyses for that dataset (45-55 minutes for the class to work through);
4. Putting together a handout with the exercise, code, and how to interpret output for those analyses, as well as useful sources for reading more about those analyses.

(Due: Your dataset, handout, and exercise should be posted to the course wiki by 9 am before the class at the latest so that students can download these.)

Description of assignments:

As you are preparing for your **presentation and handout**, you will want to think about the following areas (obviously not all of these will apply to all topics, e.g., inputting and manipulating data):

a. Explain what the statistical tool is;
b. How it is used;
c. What the assumptions are and how you test for and violate them;
d. Problems/limitations of the test;
e. Arguments about when you can use the test;
f. How the data should be set up to run that test;

g. How to interpret the code to run the test;
h. What modifications can be made in the code (i.e., changes in the arguments);
i. How you interpret output from the analysis;
j. What sources are useful for finding out more about those analyses.

Handout: You will want to give a) a summary (or copy) of your presentation, b) a copy of the first few lines of the data set with columns labeled to illustrate how it needs to be entered for your analysis, c) code and an interpretation of the code to run the analysis, d) a summary/explanation of the output from R (defining all of the components of the output), and e) useful sources for finding out more about those analyses.

Class exercise: Attached to the handout should be your exercise, using your dataset with the code you supply and then asking the class to explore the data more fully (e.g., by modifying the code in various ways or using different datasets).

Participation: Class attendance is mandatory. Class **participation** is a large component of the course. Students are encouraged to **bring their own datasets** to class to trying running different analyses during the class exercise time.

Grading

	Mon Points	**Wed Points**
Discussion leading	25	
Short paper	50	
Statistical analyses presentation, data set, hand out and exercise		150
Participation	25	50
Total	**100**	**200**

Letter grades: Will be determined on a standard scale with incremental (plus/minus) grading applying. If you have any questions or concerns regarding your marks through the semester, please schedule a meeting with me.

Biology 4889 (Senior Seminar: Biology in the news) Spring 2010

Class meetings: Tuesdays, 9:30-10:45 a.m., 116 Benton Hall.

Instructor: **Dr. Amy Zanne**
B.A., Biology, Dartmouth College, Hanover, NH.
M.Sc., Plant Ecology, University of Florida, Gainesville, FL.
Ph.D., Plant Ecology, University of Florida, Gainesville, FL.
Research Interests: Plant evolutionary biology and physiological ecology.
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Email: zannea@umsl.edu

Office Hours: Directly following class in S448 Stadler or by appointment. For appointments, please schedule in advance by email, phone, or in person.

Attendance: To ensure that you do well in this course, class attendance is essential.

Academic Honesty: Plagiarism is the use of another's words or ideas without crediting that person. Academic dishonesty, including plagiarism, cheating, or sabotage will not be tolerated and will lead to a grade of **zero** on that assignment. Students at the University of Missouri-St. Louis are expected to exhibit the highest standards of academic integrity. An act of academic dishonesty is an offense against the university. For that reason, university rules prescribe disciplinary as well as academic consequences for academic dishonesty. The complete campus policy on academic dishonesty can be found at http://www.umsl.edu/studentlife/dsa/student_planner/policies/conductcode.htm .

Classroom conduct: You are expected to adhere to the Student Code. Please turn off laptops and cell phones during class. Other disruptive behavior includes, but is not limited to, leaving class early or coming to class late, working on other class assignments, reading the newspaper, surfing the internet, talking, sleeping, or engaging in other activities that detract from the classroom experience.

Disabilities: Students requiring special accommodations should discuss these with me as soon as possible. Prior to meeting with me, you should contact the Disability Access Services Office in 144 Millennium Student Center at 516-5228.

Course objectives: This course is the Biology capstone course, integrating information from many classes you have taken. Here, you will be required to read scientific reports, examine them on their merits, and convey your findings to others. Students will get practice reading primary journal articles, dissecting research experiments, and giving written overviews, as well as oral presentations. In combination, we will be looking at biology as it is presented to the general public daily. Students will be required to read and evaluate popular press articles, to gain an overall appreciation for many different aspects of biology, become more aware of how biology is presented to the public, and learn the scientific evidence behind the "hot issues", enabling them to better discuss the topics.

Course topics: Each week, we will discuss a new topic involving some aspect of biology that makes the news, as chosen by you. The presenter for the day will find an article from a major newspaper, television source, or weekly news magazine, published within the last six months (see a suggested list of sources below; articles from the internet are not always reliable and unbiased and are allowed only from websites of major news sources). Topics may cover any aspect of biological studies, including but not limited to animal behavior, ecology, environmental biology, climate change, disease, genetic engineering, genome sequencing projects, cloning, stem cells, and genome evolution. The presenter then will find a recent related journal article, which must be from a reputable peer-reviewed journal. The student will prepare an oral presentation and written report based on these two documents.

I would encourage each of you to pick a topic you find interesting. Do not wait until the last minute and pick something just because it is convenient. Newspaper articles and the corresponding paper(s) must be discussed with me no later than 14 days before the presentation for approval. I am not opposed to more than one presentation on a similar topic, but will try and encourage everyone to choose something unique.

Because most people get their scientific knowledge about "hot issues" solely from the media, I am also interested in discussing how ideas are presented to the public and public perception. In general, I do not think the average person spends a lot of time thinking about scientific issues. Are the news reports accurate? Speculative? More dramatic than necessary? More negative or positive than deserved? What do these articles lead educated people (you) to think? What do these articles lead less scientifically educated people (my grandma) to think?

Course materials: The material for this class will be based on primary literature; PDFs of the assigned papers (journal article and news article) will be posted on MyGateway one week before class. No textbook is required.

Course evaluation: Every student will prepare an oral presentation, a written report, and contribute articles on biological issues found in the news:

Oral Presentation: Each student will give a 30-35 minute presentation, based on one news article and a corresponding journal article. Presentations must be in Power Point. Your audience is a group of your peers, who will have similar scientific backgrounds as yourself. However, the presentations also should put the topic in a larger context. A separate handout will be provided discussing specific requirements and additional information.

Written project: A written report is required on your articles as well. This project should be 2500-3000 words (~8-10 pages double spaced) and contain a detailed summary of the paper, including descriptions of background information on the topic and a context for this particular article, as well as experiments and the results. I would expect this work to reference several other papers and review articles; at least two additional research articles (four total references should be used). Figures are encouraged, but do not count toward the page limit. If you include figures from other papers, please include the original legend and be sure to reference the source. You may discuss this work with anyone you like (including me) and base the paper off any in-class discussions, but the writing must be your own.

Written projects will be due no later than one week after the oral presentation at the start of class. Projects turned in late will be penalized 5 points/day. I will read drafts of your paper any time up to one week before the paper is due (i.e., day of the presentation). I will edit for broad

content but it will still be your responsibility to edit for grammar, clarity, clearly explaining your point.

A separate handout will be provided discussing specific requirements and additional information.

Homework articles: Following the presentation, we will talk about scientific reports in the media. Throughout the semester, you will be expected to read four newspaper articles on any biological report. You will be assigned particular dates. For each article, you need to write a ~200 word summary (~one paragraph), providing an overview of the article, followed by a ~200 word opinion section, which could include questions you have about the article, a discussion on what the topic means to the general public, or any relevant ethical or moral issues. Your summary must clearly identify its source, which must follow the criteria listed below. Articles must be newer than 8/01/09. Be prepared to give a short (3-4 minute) summary on the article and your thoughts. Late assignments will be penalized 5 points/day.

Participation: *This class is a seminar class* - every student is expected to participate in class discussions. A large part of your grade reflects your presence, attention, and contributions. Questions and comments are highly encouraged, both about the main presentation and others' news stories. Because this is a discussion-based class, attendance is extremely important; absences must be excused prior to class or will require a doctor's confirmation. Points will be assigned for each class:

0 points = absent
1 point = present, but daydreaming or asleep
2 points = present and attentive, but silent
3 points = present and participating

Final grades will be determined by:

Oral presentation and discussion	35%
Written project	35%
News article summaries	15%
Participation	15%

Letter grades will be assigned on a traditional scale. Delayed grades will not be given. The ultimate drop deadline is April 10; no drops will be given after this day.

Course Outline: Note this outline is subject to modification throughout the semester.

Week	Date	Topic
1	20-Jan	Introduction to class
2	26-Jan	Brief presentation of topics
3	2-Feb	No class
4	9-Feb	Student presentation 1, Careers discussion 1
5	16-Feb	Student presentation 2, Articles 1 (group A)
6	23-Feb	Student presentation 3, Articles 2 (group B)
7	2-Mar	Student presentation 4, Careers discussion 2

8	9-Mar	Student presentation 5, Articles 3 (group A)
9	16-Mar	Student presentation 6, Articles 4 (group B)
10	23-Mar	Student presentation 7, Careers discussion 3
11	30-Mar	Spring break
12	6-Apr	Student presentation 8, Articles 5 (group A)
13	13-Apr	Student presentation 9, Articles 6 (group B)
14	20-Apr	Student presentation 10, Careers discussion 4
15	27-Apr	Student presentation 11, Articles 7 (group A)
16	4-May	Student presentation 12, Articles 8 (group B)

Biology 6920 (Special Topics: Comparative Structure and Function and Analyses in R)
Spring 2010

Class meetings: Mondays and Wednesday, 11:00 AM – 12:15 PM, Monday classes Benton 116, Wednesday classes Benton 225 (unless we have enough laptops to switch to B116)

Instructor: **Dr. Amy Zanne**
B.A., Biology, Dartmouth College, Hanover, NH.
M.Sc., Plant Ecology, University of Florida, Gainesville, FL.
Ph.D., Plant Ecology, University of Florida, Gainesville, FL.
Research Interests: Plant evolutionary biology and physiological ecology.
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Office Hours: Directly following class in S448 Stadler or by appointment. For appointments, please schedule in advance by email, phone, or in person.

Course guide: In this class, we will focus on the economy of how organisms are built, investigating trade-offs and coordination in design. We will then investigate how this variation in structure influences physiological function. Most such considerations of comparative structure and function across taxa are useful against the background of the evolutionary history of taxa being considered. We will spend time learning and employing phylogenetic comparative analyses. Additionally, the different structures we cover will be based on selecting evolutionary structural/anatomical innovations and relating these innovations to phylogenetic trees. The course will be broken down into three parts: short lectures and student-led discussions on Mondays, and hands-on use of statistical analyses with the package R on Wednesdays. Students will be responsible for learning and presenting on different statistical techniques in R. The goal will be to develop a packet of materials by the end, including code and how to interpret output from analyses. Due to my background, the lectures will utilize examples predominantly from plants, however students are expected to lead discussions and apply concepts during lectures, discussions, assignments, and data analyses to a broad array of taxa.

Course wiki: http://www.phylodiversity.net/azanne/csfar/index.php?title=Main_Page (user: csfar password: umsl123)

Attendance: Class attendance is essential and required.

Academic Honesty: Plagiarism is the use of another's words or ideas (even your own published work) without crediting that person. Academic dishonesty, including plagiarism, cheating, or sabotage will not be tolerated and will lead to a grade of **zero** on that assignment. Students at the University of Missouri-St. Louis are expected to exhibit the highest standards of academic integrity. An act of academic dishonesty is an offense against the university. For that reason, university rules prescribe disciplinary as well as academic consequences for academic dishonesty. The complete campus policy on academic dishonesty can be found at http://www.umsl.edu/studentlife/dsa/student_planner/policies/conductcode.htm .

Disabilities: Students requiring special accommodations should discuss these with me as soon as possible. Prior to meeting with me, you should contact the Disability Access Services Office in 144 Millennium Student Center at 516-5228.

Course Outline: Note this outline is subject to modification throughout the semester.

Week		Monday	Wednesday
1	18-Jan	*No class: MLK holiday*	Introduction to class
2	25-Jan	**Vascular transport, mechanical support, storage:** Stems (including vascular pathways, growth forms, woody/herbaceous)	Introduction to R
3	1-Feb	*Class canceled*	*Class canceled*
4	8-Feb	**Energy acquisition, vascular transport, and gas exchange**: Leaves (including venation, shape, sclerophylly, broad/needle, other photosynthetic structures) – *Peter Stevens*	Inputting and manipulating data
5	15-Feb	**Energy acquisition and biochemical pathways:** Photosynthetic pathways (C3, C4, CAM)	Inputting and manipulating data
6	22-Feb	**Nutrient and water acquisition and anchorage:** Roots (including architecture, cluster, gas exchange, contractile)	Other analyses: GLM, SMA, GLMM, Quantile regression
7	1-Mar	**Symbioses:** (including mycorrhizae, N-fixing, endophytes)	Other analyses: GLM, SMA, GLMM, Quantile regression
8	8-Mar	**Reproduction and attracting mates:** Flowers (including zygomorphy, pollination, flowering time), **SHORT PAPERS DUE**	Multivariate analyses: Ordination
9	15-Mar	**Dispersal of individuals in space:** Fruits, seeds (including size, endosperm, associations with dispersers)	Multivariate analyses: Ordination
10	22-Mar	**Juvenile stages and development:** Gametophytes (including timing of pollen growth on the stigma)	Graphing
11	29-Mar	*Spring break*	*Spring break*
12	5-Apr	**Phylogenetic comparative trait and community analyses**	Graphing
13	12-Apr	**Genomes:** (including duplication, polyploidy)	Phylogenetic comparative analyses: Traits
14	19-Apr	**Communities, biogeography, and selective forces:** Flora (including NZ	Phylogenetic comparative analyses: Traits

		flora and moa herbivory)	
15	26-Apr	**Whole organism:** (including Gnetum)	Phylogenetic comparative analyses: Communities
16	3-May	**Defense:** (including spikes and chemicals)	Phylogenetic comparative analyses: Communities

Expectations and assignments:
Mondays: We will focus on links between structure and function by selecting links that show interesting evolutionary innovation. For my lectures (10-20 minutes), I will select innovations across the plant phylogeny but I encourage you to select topics (for your paper discussion and for your short paper) from any taxa, as long as it shows evolutionary innovation in structure leading to differences in function.

Assignments:
1. Select a paper, post question(s), and lead a class discussion following a brief introduction to your topic **(Due: Paper and questions posted 1 week in advance)**
2. Write a short paper on a topic of your choice **(Due: 8 March in class)**
3. Participate in class by reading the papers and posting questions to the course wiki before class **(Due: Questions posted to the wiki by 9 am before class, ideally sooner)**

I strongly encourage you to **meet with me** before your paper discussion to check on the theme and paper you are selecting, as well as topic for your paper.

Description of assignments:
1. **Discussion:** Each student will be responsible for **selecting a paper** related to that class' theme (apply the theme broadly or let me know if your topic of interest does not seem to be on the syllabus e.g., having a brain, sensing the environment), **pose questions(s)**, give a **short summary** of your topic, and **lead a discussion** (~1 hour) on that paper. You can choose to run the discussion as you see fit (e.g., some combination of the entire class together, small break-out groups, panel debates, etc.). To facilitate this, you should pose one or more questions to help focus class discussion. These questions and the paper should be posted on the course wiki **one week before** the papers are discussed. You should begin your discussion by briefly describing your broad topic, evolutionary innovation, where in the phylogeny this innovation occurs, and why this paper is representative of that innovation.
2. **Short paper:** You will also be expected to write a **short paper due on 8 March** (3-5 pages) on a particular evolutionary innovation in structural design. The topic can, but does not have to be, the same as your paper theme. Your paper should:
    a. Briefly and generally introduce your topic;
    b. Describe where in the phylogeny your innovation occurred;
    c. Describe what the evolutionary innovation in structural design is, comparing this design to closely related taxa who lack these evolutionary shifts;
    d. Explain how the shift in design allowed the taxa to function differently (or perhaps in the same way but via different means);
    e. End with your assessment, explaining in what scenarios taxa having the evolutionary innovation are better off than taxa that lack this innovation (Are taxa

with that innovation more competitive in certain settings? Or might it just be a different way to do the same thing?);

f. You should include at least **8 references**. You will need to include both inline citations and a bibliography section formatted for a standard journal in ecology and evolution. I strongly encourage you to add inline references and build your bibliography using a reference manager. Last semester we used Zotero (http://www.zotero.org/) and it worked very well. If anyone wants to schedule time to see how this works, let me know.

3. **Participation and question:** Class attendance is mandatory. Class **participation** is a large component of the course. Besides participating in class discussions, this participation includes **posting at least one question** for that week's paper to the class wiki ahead of time (by 9 am before class).

Wednesdays: We will focus on statistical analyses using the program R. I have divided up the class into 6 topics over 12 weeks and we have more than that enrolled in the class so 2-3 people will likely work on each topic. Each person is expected to contribute to all parts of the project.

To assist you in preparing for the class you will lead, I have posted a large number of links on the course wiki. Please add to these. Also, from my own library, I have a reasonable collection of books available for you to use. These will be placed in Bob Ricklefs' library. Please use them in the library. If you want to take a book out to photocopy, please sign it out and immediately return it in case someone else needs it. You are expected to lead a class by:

Assignments:

1. Giving a presentation about that topic (20-30 minutes allowing for questions as we go along);
2. Finding (from the literature, a friend, one used in an earlier week, one of your own, or something you make up) a dataset;
3. Developing a class exercise to run the analyses for that dataset (45-55 minutes for the class to work through);
4. Putting together a handout with the exercise, code, and how to interpret output for those analyses, as well as useful sources for reading more about those analyses.

(Due: Your dataset, handout, and exercise should be posted to the course wiki by 9 am before the class at the latest so that students can download these.)

Description of assignments:

As you are preparing for your **presentation and handout**, you will want to think about the following areas (obviously not all of these will apply to all topics, e.g., inputting and manipulating data):

1. Explain what the statistical tool is;
2. How it is used;
3. What the assumptions are and how you test for and violate them;
4. Problems/limitations of the test;
5. Arguments about when you can use the test;
6. How the data should be set up to run that test;

7. How to interpret the code to run the test;
8. What modifications can be made in the code (i.e., changes in the arguments);
9. How you interpret output from the analysis;
10. What sources are useful for finding out more about those analyses.

Handout: You will want to give a) a summary (or copy) of your presentation, b) a copy of the first few lines of the data set with columns labeled to illustrate how it needs to be entered for your analysis, c) code and an interpretation of the code to run the analysis, d) a summary/explanation of the output from R (defining all of the components of the output), and e) useful sources for finding out more about those analyses.

Class exercise: Attached to the handout should be your exercise, using your dataset with the code you supply and then asking the class to explore the data more fully (e.g., by modifying the code in various ways or using different datasets).

Participation: Class attendance is mandatory. Class **participation** is a large component of the course. Students are encouraged to **bring their own datasets** to class to trying running different analyses during the class exercise time.

Grading

	Mon Points	**Wed Points**
Discussion leading	25	
Short paper	50	
Statistical analyses presentation, data set, hand out and exercise		150
Participation	25	50
Total	**100**	**200**

Letter grades: Will be determined on a standard scale with incremental (plus/minus) grading applying. If you have any questions or concerns regarding your marks through the semester, please schedule a meeting with me.

Biology 2102 (General Ecology) Fall 2009

An examination of relationships between living organisms and their environment.

Class meetings: Mondays and Wednesdays, 8:00-9:15 a.m., B243 Benton Hall

Instructor: **Dr. Amy Zanne**
B.A., Biology, Dartmouth College, Hanover, NH.
M.Sc., Plant Ecology, University of Florida, Gainesville, FL.
Ph.D., Plant Ecology, University of Florida, Gainesville, FL.
Research Interests: Plant evolutionary biology and physiological ecology.
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Email: zannea@umsl.edu

Office Hours: Directly following class in S448 Stadler or by appointment. For appointments, please schedule in advance by email, phone, or in person.

Course prerequisites: Biology 1811 and 1821.

Course guide: In this class, we will examine how organisms interact with one another and with their surrounding environments. We will look at these interactions over different spatial and temporal scales from the level of the organism up to the biosphere. Throughout the semester we will reflect on how humans have influenced these interactions.

Course Materials:
Recommended text: Robert E. Ricklefs (2008). The Economy of Nature (6th edition). W.H. Freeman and Company, New York. Available at the university bookstore and other locations.
Online text resources: http://bcs.whfreeman.com/ricklefs6e
Lecture outlines: Will be posted on MyGateway. These should be used as study guides but not be considered a replacement for class attendance and note taking.

Attendance: To ensure that you do well in this course, class attendance is essential.

Academic Honesty: Plagiarism is the use of another's words or ideas without crediting that person. Academic dishonesty, including plagiarism, cheating, or sabotage will not be tolerated and will lead to a grade of **zero** on that assignment. Students at the University of Missouri-St. Louis are expected to exhibit the highest standards of academic integrity. An act of academic dishonesty is an offense against the university. For that reason, university rules prescribe disciplinary as well as academic consequences for academic dishonesty. The complete campus policy on academic dishonesty can be found at http://www.umsl.edu/studentlife/dsa/student_planner/policies/conductcode.htm .

Classroom conduct: You are expected to adhere to the Student Code. Please turn off laptops and cell phones during class. Other disruptive behavior includes, but is not limited to, leaving

class early or coming to class late, working on other class assignments, reading the newspaper, surfing the internet, talking, sleeping, or engaging in other activities that detract from the classroom experience.

Disabilities: Students requiring special accommodations should discuss these with me as soon as possible. Prior to meeting with me, you should contact the Disability Access Services Office in 144 Millennium Student Center at 516-5228.

Course Outline: Note this outline is subject to modification throughout the semester.

Date	**Topic**	**Chapter**
I. Introduction		
Monday, August 24	Introduction. What is ecology?; Human ecology example	1
Wednesday, August 26	Ecology and evolution	6
II. Life and the Physical Environment		
Monday, August 31	The physical environment: water, nutrients, light and temperature	2, 3
Wednesday, September 2	Adaptation to environments – water and soils; osmosis; water balance in plants	2
Monday, September 7	**No class (Labor Day)**	
Wednesday September 9	Adaptation to environments – light and photosynthesis ***Assignment 1 due***	3
Monday, September 14	Adaptation to environments – water and salt balance in animals	2
Wednesday, September 16	Adaptation to environments – temperature	3
Monday, September 21	Variations in the physical environment – climate; soils; lakes	4
Wednesday, September 23	Global climate change	3, 4, 21
Monday, September 28	Biological communities: The biome concept *Exam review*	5
Wednesday, September 30	***Exam 1***	
III. Ecosystems		
Monday, October 5	Energy in the ecosystem - Primary production (**Guest speaker: Dr. Patrick Osborne**)	22
Wednesday, October 7	Energy in the ecosystem - Energy flow, food chains, energy budgets; Pathways of elements in ecosystems (**Guest speaker: Dr. Patrick Osborne**)	22, 23
Monday, October 12	Nutrient regeneration in ecosystems	24
IV. Organisms		

Wednesday, October 14	Life histories and evolutionary fitness	7
Monday, October 19	Sex, family, society, and evolution ***Assignment 2 due***	8, 9
V. Populations		
Wednesday, October 21	Population structures	10
Monday, October 26	Population growth and regulation; Temporal and spatial dynamics of populations	11, 12
VI. Species interactions		
Wednesday, October 28	Predation and herbivory; Dynamics of predation	14, 15, 17
Monday, November 2	Competition	16
Wednesday, November 4	Population genetics and evolution; Coevolution	6, 13,17
Monday, November 9	Population growth calculations *Exam review*	15
Wednesday, November 11	***Exam II***	
VII. Communities		
Monday, November 16	Community structure	18
Wednesday, November 18	Community development ***Assignment 3 due***	19
Monday, November 23	No class (Thanksgiving)	
Wednesday, November 25	No class (Thanksgiving)	
Monday, November 30	Biodiversity	20
Wednesday, December 2	History and Biogeography ***Assignment 4 due***	21
VIII. Ecological Applications		
Monday, December 7	Humans and Ecology	26, 27
Wednesday, December 9	*Revision*	1-27
Monday, December 14	***Final exam 7:45-9:45 a.m.***	

Course evaluation:
Exams

Three examinations will be given which will cover material presented since the previous exam. Each examination is worth 100 points. The first two exams will be in class. The final exam will be during exam week. Exams will consist of a mix of short answer (e.g., definitions, true/false, multiple choice, fill in the blank) and long answer (e.g., essays). Time to review material prior to each exam has been allocated in the above outline. You should plan to come to these reviews with questions for me.
Note: No make-up exams will be given without a legitimate reason provided in advance.

Assignments

*Assignment 1***:** Write a letter to a grandparent (1-2 double-spaced, typed printed pages), explaining the major pressures behind a local environmental issue and why it is important for them (or not) to support this local initiative. More information soon on format of the paper. **Due Wednesday, September 9, 2009 at beginning of class.**

Assignment 2: Select a species and write a short article (1-2 double-spaced, typed, printed pages plus citations) describing the adaptations it shows to this environment and how you expect it to respond to climate change. More information soon on format of the paper. **Due Monday, October 19, 2009 at beginning of class**.

Assignment 3: This will consist of a series of population ecology problems that you will need to solve: **Due Monday, November 18, 2009 at beginning of class.**

Assignment 4: Tree journal, Select a tree and describe over fall semester how the leaves change color across individual leaves and across the entire tree, as well as the pattern of leaf loss. Follow the tree until it loses all of its leaves or until the assignment is due. It is likely useful to record information on weather conditions. **Due Deceomber 2, 2009 at beginning of class. Note:** Due at start of class. Assignments can be turned in late but will be docked 10 points for each day late. This includes turning them in after the start of class.

Ecology in the news

On Mondays students will give a brief (1-2 minute) overview of some aspect of ecology in the recent news (within the past year). You must mention the relevance of the article to ecology. Each student must present once in the semester on a unique story, not previously presented by other students, and then turn in a printed handout of the article (taken from an internet news site or a printed news journal). A sign up sheet will be passed out on the first day of classes. The New York Times, USA Today and St. Louis Dispatch are available for free to students in the red vines (http://www.umsl.edu/services/ctl/instr_support/newspapers.html)

Note: If you miss your date, you will be allowed one make up at my discretion if there are any open slots later in the semester.

Grading

	Points	**Date**
Examination 1	100	Wednesday, September 30
Examination 2	100	Wednesday, November 11
Final examination	100	Monday, December 14
Assignment 1	15	Wednesday, September 9
Assignment 2	40	Monday, October 19
Assignment 3	30	Wednesday, November 18
Assignment 4	15	Wednesday, December 2
Ecology in the news	10	Mondays
Total	**410**	

Letter grades: Will be determined on a standard scale with incremental (plus/minus) grading applying. If you have any questions or concerns regarding your marks through the semester, please schedule a meeting with me.

On campus resources: When students' work conveys that they require additional help, students will be referred to 1. Writing Lab (http://www.umsl.edu/~umslenglish/writing_lab/writinglab.html), 2. Math Lab (http://www.cs.umsl.edu/lab/mathlab.html), or 3. Center for Student Success (http://www.umsl.edu/services/css/). If I feel it is to your benefit, I will use the Academic (Early) Alert system (http://www.umsl.edu/studentlife/dsa/student_planner/academics/earlyalert.htm).

Withdrawal from the course: Students may withdraw from the course with a grade of "excused" up to one week after the first exam is returned. After that date, a withdrawal will be given as "excused" only if a student has above a 60%.