Syllabus and Course Information
Community Ecology (Bio 419) – Spring 2019

MacArthur's Warblers
(Artist: Deborah Kaspari)

Instructor: Dr. Jonathan Myers, Associate Professor
jamyers@wustl.edu, 314-935-3167, McDonnell 409
Help sessions: Wednesday 4:00–5:00 p.m., or by appt.
Laboratory website: myersecologylab.com
WashU page: biology.wustl.edu/people/jonathan-myers

Assistant to the Instructor: Chris Catano, PhD Student
chcatano@gmail.com, 314-935-8396, McDonnell 418
Help sessions: Monday 1:00–2:00 p.m., or by appointment
Research website: http://chcatano.wix.com/ecology

Undergraduate Teaching Assistants:
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Course Description:
Community ecology is an interdisciplinary field that bridges concepts in biodiversity science, biogeography, evolution and conservation. This course provides an introduction to the study of pattern and process in ecological communities with an emphasis on theoretical, experimental and quantitative approaches. Topics include: ecological and evolutionary processes that create, maintain or modify patterns of biodiversity; biodiversity and ecosystem function; island biogeography; metacommunity dynamics; niche and neutral theory; species interactions (competition, predation, food webs) and species coexistence; and effects of human-mediated environmental change (climate change, habitat alteration, invasive species) on biodiversity. The class format includes lectures, discussions, and hands-on simulations using the R language for statistical computing and graphics.

Prerequisites:
Principles of Biology II (Bio 2970) required, or permission of instructor.

After completing this course you should be able to:
1) ***Explain*** and ***evaluate*** the four fundamental ("high-level") processes of community ecology, how ecologists study them empirically, and why these processes are important for conservation and environmental sustainability.
2) ***Summarize***, ***evaluate***, ***explain*** and ***discuss*** primary literature in community ecology and ***reflect*** on its scientific impact.
3) ***Appreciate*** uncertainty in the field of community ecology.

Class meeting times & locations:
- Monday (Lecture): 2:30–4:00 p.m., McDonnell 361
- Wednesday (Discussion): 2:30–4:00 p.m., McDonnell 361 & McDonnell 412

Textbook (required):
Mittelbach, Gary G. 2012. *Community Ecology*. Sinauer Associates, Sunderland, MA.

Course website:
The course website will be on Canvas (mycanvas.wustl.edu). The website will contain the syllabus, current course schedule and assignments, slides, a grade book, reading material, and important course announcements. Unless instructed otherwise, you will upload all assignments to Canvas. You should check the course website on a regular basis, and to help stay up-to-date on the course, we recommend setting the option to receive an email when we post announcements. You can access help for Canvas at: mycanvas.wustl.edu/studentsupport/

Course schedule, readings, and other assignments:
The course schedule, readings, and other assignments will be posted on Canvas.

Assessment:
The grade you earn in this course will be based on the following components:

400 points	Take-home exams – 2 exams (40% of final grade)
	• 200 points Take-home exam 1 (20%)
	• 200 points Take-home exam 2 (20%)
250 points	Discussion preparation & participation (25%)
	• 100 points Discussion Question Journal – 10 total (10%)
	• 150 points In-class participation (15%)
200 points	In-class presentation (20%)
	• 50 points Presentation proposal (5%)
	• 150 points Presentation (15%)
100 points	Mini-quizzes on pre-lecture readings – 10 total (10%)
50 points	Attendance and in-class participation in lecture (5%)
1000 points	Total

The following scale will be used to assign final course grades. If you are taking this course Credit/No Credit, you must receive a C+ or better to receive credit.

A+	97-100%	B+	87-89%	C+	77-79%	D+	67-69%	F	0-59%
A	93-96%	B	83-86%	C	73-76%	D	63-66%		
A-	90-92%	B-	80-82%	C-	70-72%	D-	60-62%		

Take-home exams:
The goal of the take-home exams is to demonstrate your ability to ***explain***, ***evaluate*** and ***synthesize*** fundamental concepts, observations, and approaches in community ecology. The exams will integrate reading assignments, lecture material, and primary literature from discussions. You must work independently on the exam and cannot discuss this exam with anyone. You will have 1 week to complete each exam. There is no final exam.

Exam re-grading policy: Every attempt will be made to grade fairly, consistently, and accurately. If you disagree with the way your answer on your individual exam was graded, you may submit a written request for a re-grade within 72 hours of receipt of your graded exam. We will examine re-grade requests at the end of the semester if your grade is borderline, at which point we reserve the right to re-grade the entire exam.

Discussion preparation & participation:
The goal of the discussions is to provide you with the opportunity to: develop skills in reading primary literature; ***summarize*** and critically ***evaluate*** concepts and data; ***explain***, ***discuss*** and ***reflect*** on how these research papers link to the broader conceptual framework of the course; and ***appreciate*** uncertainty in the field of community ecology.

Guidelines & tips for preparing for discussions: The instructors will provide guidelines and tips on how to read, evaluate, interpret, and discuss primary literature. Some useful questions to consider while reading the paper(s) and preparing for discussions include:

1. ***Reflect*** on the key ideas from lecture and previous discussions:
    a) What key idea(s) emerged from lecture and the previous discussion that you found particularly interesting?
    b) How do the concepts in the paper(s) for this week connect to concepts from one or two relevant prior papers and/or lectures?

2. ***Summarize*** the key questions and results and practice ***explaining*** them to yourself:
    c) What is the main question the researchers are hoping to address with their study?
    d) What is/are the main hypothesis(es) they provide regarding this question?
    e) What predictions do they make regarding these hypotheses, specific to their study?
    f) What evidence do they provide to support or refute the hypotheses?
    g) How has the paper helped to resolve (or fuel) controversial topics?
    h) How might remaining disagreements, empirical gaps, or theoretical gaps be resolved through additional experiments, observations, or other approaches?
    i) What surprised, confused, or struck you most about the paper?

Discussion preparation & participation grades: Your grade for the discussions will be based on two assessments:

1. Discussion Question Journal:
Writing about the discussion paper(s) encourages you to think about and engage with the text in deeper and more meaningful ways. To that end, the goals of the Discussion Question Journal are to: a) help you prepare for and participate in discussion; b) assess your ability to ***summarize***, ***explain***, and ***reflect*** on primary literature; c) "prime" the class for a fun and productive discussion; and d) provide current and future graduate students with a study resource to help prepare for qualifying exams in graduate school. Your journal will consist of a single document that includes entries for each discussion (10 total entries), with the journal entries ordered from newest (first page) to oldest (last page). Each entry will include short answers to 2–4 questions provided in advance by the instructors, and 3 questions that you provide for group discussion. Here are some tips for writing good discussion questions:

a) Think about questions you would like to discuss while reading the paper(s).
b) Strive to avoid factual types of questions that will lead to short responses (e.g., how much species diversity is there in the microbiome?) and aim to ask about deeper questions or topics that will lead to back-and-forth discussion (e.g., what factors contribute to high species diversity in the microbiome?).
c) Try to ask a series of connected questions, as these often lead to extended discussion.
d) Whenever possible, bring in connections to past readings, themes, or topics.
e) Use quotes from the text.

Prior to each discussion, the instructors will choose selected questions from your journals for discussion. If one of your questions is selected, you should be prepared to elaborate on it in the group discussion. The due date for uploading entries to your discussion question journal will be Tuesday at 11:59 p.m. We will provide an example journal entry for our first discussion.

2. In-class participation:
Participation will be assessed based on your level of preparation and participation, including: knowledge of the assigned reading; contributions to small-group discussions; integration of the assigned reading with lecture material and previous discussions; clarity, creativity and logic of your questions and arguments; and the productiveness of the discussion. Your grade for each discussion will be based on a total of 4 contribution points. To receive 4 contribution points, you will need to make 4 **substantive** contributions to both small-group and whole-group discussions. A substantive contribution is one that: demonstrates in-depth understanding of the assigned reading; integrates the assigned reading with lecture material or previous discussions; demonstrates clarity, creativity and logic of the questions and arguments; and/or leads to productive discussion. Examples of non-substantive contributions include: agreeing or disagreeing with a contribution from a classmate without elaborating on your contribution; discussing peripheral or unrelated topics that move the discussion away from the main concepts relevant to the papers; and posing questions that require your peers to simply re-state facts from the paper.

In-class presentation:
The goal of the in-class presentation is to demonstrate your ability to ***evaluate*** and ***synthesize*** primary literature on a topic of interest to you, ***reflect*** on how this topic links to broader conceptual frameworks in the field of community ecology, and ***explain*** this topic to your peers. As an audience member, the presentations will provide an opportunity for you to develop a deeper appreciation for the diversity of questions, approaches, and applications that motivate the careers and interests of real-world ecologists.

Topics: Early in the semester, you will choose a case study from the literature that provides empirical evidence for one or more of the "high-level" processes in community ecology: dispersal; ecological drift; selection; and speciation. The case study may include experimental or observational studies of organisms in the field or lab. The instructors will provide examples of classic and contemporary case studies during the first few weeks of class. You may choose one of these case studies (on a first come, first served basis) or another case study that you find exciting. The case study may be based on research conducted by a single ecologist or multiple ecologists that have studied the same concept, organisms, or ecosystems. The case study should: 1) provide a compelling example of one or more of the "high-level" processes; 2) provide an example from an ecological community comprised of two or more species (i.e., the case studies cannot come from studies of single-species populations); and 3) interest you. For case studies involving food webs or mutualistic networks (i.e., “vertical communities”; Vellend 2016), the case study must include two or more species in at least one level of the vertical community (e.g., two or more species in a “horizontal community” [Vellend 2016] of consumers [herbivores, pathogens, predators] or resources [hosts, prey, etc.]). If you are conducting graduate or undergraduate thesis research, we encourage you to choose a case study directly related to your research and to view this presentation as an opportunity to help advance your research. As an alternative to selecting a single case study, graduate students will have the option to conduct a quantitative meta-analysis on a larger number of empirical studies focused on one or more of the

"high-level" processes. You must have your case study or meta-analysis pre-approved by e-mailing Jonathan Myers a short description of your proposed case study at least 1 week before the presentation proposal is due.

Presentation grades: Your presentation grade will be based on two assessments:

1. Presentation proposal:
After choosing your case study, you will conduct a literature search for at least 2–3 peer-reviewed journal articles focused on experimental or observational studies of the concepts, organisms, or ecosystems of interest. These papers will form the basis for your proposal and presentation. You will use these papers to write a 2-page, single-spaced proposal that outlines the introduction, methods, results, and conclusions of the presentation. The proposal due date and instructions will be posted on Canvas.

2. Presentation:
Presentations should be 10 minutes in length, followed by 2 minutes for questions and answers, and formatted for an audience at a professional scientific conference such as the Annual Meeting of the Ecological Society of America (ESA) (esa.org). On the day of your scheduled presentation, you will be required to upload an electronic copy (PDF or Powerpoint) of your presentation to Canvas by 12:00 p.m. Presentations will be evaluated on content over showmanship. Grades will be based on the quality of your literature synthesis, the conceptual integration of the empirical papers with one or more of the "high-level" processes, and the clarity of presentation. The instructors will provide a grading rubric prior to the presentations.

Attendance and in-class participation in lecture:
We expect you to attend and actively participate in all class meetings by voicing your opinions and asking questions. You are responsible for all material covered in class whether or not you attend. If you anticipate that you must be absent from a class for a legitimate reason, please e-mail Jonathan Myers in advance.

Mini-quizzes on pre-lecture readings:
The goals of the mini-quizzes are to 1) evaluate your understanding of key concepts from the pre-lecture reading assignments from the textbook or primary literature, and 2) foster in-depth discussion of key concepts during lecture and paper discussions.

Late work:
To be fair to all students and to the instructors who are responsible for grading, **no late work** will be accepted after the item is due. You are required to keep copies of all work. We will not consider technology excuses. Please make sure to frequently back up your work to avoid losing data.

Academic integrity:
The academic integrity policy of Washington University in St. Louis states: “Effective learning, teaching and research all depend upon the ability of members of the academic community to trust one another and to trust the integrity of work that is submitted for academic credit or conducted in the wider arena of scholarly research. Such an atmosphere of mutual trust fosters the free exchange of ideas and enables all members of the community to achieve their highest potential. In all academic work, the ideas and contributions of others must be appropriately acknowledged, and work that is presented as original must be, in fact, original. Faculty, students,

and administrative staff all share the responsibility of ensuring the honesty and fairness of the intellectual environment at Washington University."

The complete policy and procedures are available at: studentconduct.wustl.edu/integrity/policy. As a student at Washington University, it is your responsibility to become familiar with, understand, and abide by the standards outlined in this policy before performing any academic work. Ignorance of these policies is not a defense in cases of infringement.

Any person found using unauthorized assistance (including plagiarism, submitting work for more than one class without obtaining permission from all instructors, copying answers from another student's exam, or turning in group work to which you did not contribute) will be forwarded to the Committee for Student Academic Integrity. Students found guilty by the Committee will be given a grade of F for the course and be referred to the Dean for further action.

Laptops and cell phones:
To help facilitate an interactive learning environment with minimal distractions, the use of laptops will not be allowed during Monday lectures. Laptops will be allowed for Wednesday discussions, and at least one of these classes will be devoted to hands-on computer simulations using the R language for statistical computing and graphics. During discussions, you may not use your laptop for activities unrelated to the discussion, including email, social media (e.g., Facebook, Instagram, Twitter), text messaging, or web browsing, as these activities are very distracting to the other students and the instructors. You may bring phones to class but the sound must be muted. You may not use your phone or text message during class. Doing so will reduce your participation grade.

Resources to help you succeed:

Academic resources: The Natural Sciences Learning Center (NSLC) (nslc.wustl.edu) located in the Life Sciences building (near the greenhouse) has a computer lab and rooms available for study groups. Cornerstone offers free academic peer mentoring and training in learning skills (cornerstone.wustl.edu).

Accommodations based upon sexual assault: The University is committed to offering reasonable academic accommodations to students who are victims of sexual assault. Students are eligible for accommodation regardless of whether they seek criminal or disciplinary action. Depending on the specific nature of the allegation, such measures may include but are not limited to: implementation of a no-contact order, course/classroom assignment changes, and other academic support services and accommodations. If you need to request such accommodations, please direct your request to Kim Webb, Director of the Relationship and Sexual Violence Prevention Center, or Jen Durham Austin, Support Services Counselor. Both Kim Webb and Jen Durham Austin are confidential resources; however, requests for accommodations will be shared with the appropriate University administration and faculty. The University will maintain as confidential any accommodations or protective measures provided to an individual student so long as it does not impair the ability to provide such measures.
If a student comes to me to discuss or disclose an instance of sexual assault, sex discrimination, sexual harassment, dating violence, domestic violence or stalking, or if I otherwise observe or become aware of such an allegation, I will keep the information as private as I can, but as a faculty member of Washington University, I am required to immediately report it to my Department Chair or Dean or directly to Ms. Jessica Kennedy, the University's Title IX

Director. If you would like to speak with directly Ms. Kennedy directly, she can be reached at (314) 935-3118, jwkennedy@wustl.edu, or by visiting the Title IX office in Umrath Hall. Additionally, you can report incidents or complaints to the Office of Student Conduct and Community Standards or by contacting WUPD at (314) 935-5555 or your local law enforcement agency. See: Title IX.

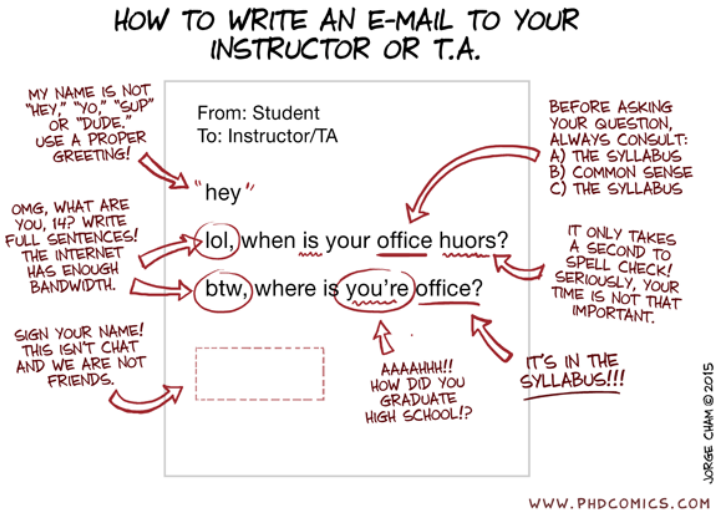
You can also speak confidentially and learn more about available resources at the Relationship and Sexual Violence Prevention Center by calling (314) 935-3445 for an appointment or visiting the 4th floor of Seigle Hall. See: RSVP Center

Bias reporting: The University has a process through which students, faculty, staff and community members who have experienced or witnessed incidents of bias, prejudice or discrimination against a student can report their experiences to the University's Bias Report and Support System (BRSS) team. See: brss.wustl.edu.

Mental health: Mental Health Services' professional staff members work with students to resolve personal and interpersonal difficulties, many of which can affect the academic experience. These include conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety and depression.

Center for Diversity and Inclusion (CDI):
The Center of Diversity and Inclusion (CDI) supports and advocates for undergraduate, graduate, and professional school students from underrepresented and/or marginalized populations, creates collaborative partnerships with campus and community partners, and promotes dialogue and social change. One of the CDI's strategic priorities is to cultivate and foster a supportive campus climate for students of all backgrounds, cultures and identities.
See: diversityinclusion.wustl.edu/

Contacting us: Please feel free to email, call us, or to stop by office hours. Please allow 48 hours for email responses and do not wait until the last minute (e.g., after 5:00 p.m. or a weekend) to contact us, as we may be unavailable to reply. When e-mailing us, please strive to use professional email etiquette. For example, use clear subject lines, use a salutation to open your email, sign off with your full name, and avoid using informal phrases or words such as "Hey" or textspeak.



Want to learn more? Recommended books for further reading:

Chase, Jonathan M. & Mathew A. Liebold. 2003. *Ecological Niches: Linking Classical and Contemporary Approaches*. University of Chicago Press, Chicago, IL.

Gotelli, Nicholas J. 2008. *A Primer of Ecology, 4th Ed*. Sinauer Press, Sunderland, MA.

Gotelli, Nicholas J. & Aaron M. Ellison. 2004. *A Primer of Ecological Statistics*. Sinauer Press, Sunderland, MA.

Hubbell, Stephen. 2001. *The Unified Neutral Theory of Biodiversity and Biogeography*. Princeton University Press, Princeton, NJ.

Levin, Simon A., Stephen R. Carpenter, H. Charles J. Godfray, Ann P. Kinzig, Michel Loreau, Jonathan B. Losos, Brian Walker & David S. Wilcove (eds). 2010. *The Princeton Guide to Ecology*. Princeton University Press, Princeton, NJ.

Magurran, Anne E. & Brian J. McGill (eds). 2011. *Biological Diversity: Frontiers in Measurement and Assessment.* Oxford University Press, Oxford, U.K.

Real, Leslie A. & James H. Brown (eds). 1991. *Foundations of Ecology: Classic Papers with Commentaries*. University of Chicago Press, Chicago, IL.

Vellend, Mark. 2016. *The Theory of Ecological Communities*. Princeton University Press, Princeton, NJ.

Course Schedule: Community Ecology (Bio 419) – Spring 2019 (Updated Mar. 24, 2019)*

***Notes**: The schedule, reading assignments and due dates are subject to change.
All assignments must be uploaded to Canvas by 11:59 p.m. on the due date.

Week	Day	Date	Topic
1	Mon	1/14	**Lecture**: Welcome to community ecology
	Wed	1/16	**Lecture**: The theory of ecological communities **Key concepts**: Dispersal; ecological drift; selection; speciation
2	Mon	1/21	**No class –** Martin Luther King Day
	Wed	1/23	**Discussion**: Ricklefs 2008; Brooker *et al*. 2009; Ricklefs 2009; Vellend 2010
3	Mon	1/28	**Lecture**: Ecological drift & dispersal I **Key concepts**: The theory of island biogeography; species-area relationships (SARs)
	Wed	1/30	**Discussion**: Powell *et al*. 2013; Wagner *et al.* 2014
4	Mon	2/4	**Lecture**: Ecological drift & dispersal II **Key concepts**: The unified neutral theory of biodiversity and biogeography
	Wed	2/6	**Discussion**: Siepielski *et al*. 2010; Germain *et al*. 2017
5	Mon	2/11	**Lecture**: Selection in ecological communities I **Key concepts**: Coexistence theory; niche theory; three fundamental forms of selection
	Wed	2/13	**R workshop**: Simulating community dynamics under ecological drift, dispersal & selection
6	Mon	2/18	**Lecture**: Selection in ecological communities II **Key concepts**: Constant selection; negative frequency-dependent selection; Lotka-Volterra competition; R* theory
	Wed	2/20	**Discussion**: Byers 2000; Dybzinski & Tilman 2007
7	Mon	2/25	**Lecture**: Selection in ecological communities III **Key concepts**: Negative frequency-dependent selection; spatially variable selection; enemy-mediated coexistence; Janzen-Connell hypothesis
	Wed	2/27	**Discussion**: Terborgh 2015; Condon *et al*. 2014; Godfray 2014
8	Mon	3/4	**Lecture**: Selection in ecological communities IV **Key concepts**: Positive frequency-dependent selection; priority effects
	Wed	3/6	**Discussion:** Fukami 2018; Srivastava 2018; Tucker & Fukami 2014; Fukami *et al*. 2010
9	3/10–3/16		**No class –** Spring Break
10	Mon	3/18	**Lecture**: Dispersal, drift and selection in metacommunities **Key concepts:** Mass effects; neutral metacommunities; patch dynamics; species sorting
	Wed	3/20	**Discussion**: Ellis *et al*. 2006; Grainger *et al*. 2017
11	Mon	3/25	**Lecture**: Speciation & species pools **Key concepts**: Species-pool hypothesis; latitudinal-diversity gradient
	Wed	3/27	**Discussion**: Cornell 2013; Price 2015; Rabosky & Hurlbert 2015; Harmon & Harrison 2015
12	Mon	4/1	**Lecture**: Biodiversity & ecosystem functioning **Key concepts**: Diversity-invasibility relationships; diversity-productivity relationships; niche-complementarity hypothesis; species-selection hypothesis
	Wed	4/3	**Discussion**: Cadotte 2013; Zuppinger-Dingley *et al*. 2014; Tilman & Snell-Rood 2014
13	Mon	4/8	**Discussion**: Community ecology in the Anthropocene – Scheffers *et al*. 2016; Urban *et al*. 2016; Pecl *et al*. 2017
	Wed	4/10	**Presentation workshop**
14	Mon	4/15	**Student presentations**
	Wed	4/17	**Student presentations**
15	Mon	4/22	**Student presentations**
	Wed	4/24	**Student presentations**

Assignments: Community Ecology (Bio 419) – Spring 2019 (Updated Mar. 24, 2019)*

***Notes**: The schedule, reading assignments and due dates are subject to change.
All assignments must be uploaded to Canvas by 11:59 p.m. on the due date.

Week	Day	Date	Reading assignments	Other assignments
1	Mon	1/14		
	Wed	1/16	Mittelbach Chapter 1; Vellend 2010	Mini-quiz #1
2	Mon	1/21	**No class** – Martin Luther King Day	
	Tue	1/22		Journal entry #1
	Wed	1/23	Ricklefs 2008; Brooker *et al*. 2009; Ricklefs 2009; Vellend 2010	
3	Mon	1/28	Mittelbach Chapter 2; Warren *et al*. 2015	Mini-quiz #2
	Tue	1/29		Journal entry #2
	Wed	1/30	Powell *et al*. 2013; Wagner *et al.* 2014	
4	Mon	2/4	Mittelbach Chapter 13 (pages 276-283: "The Neutral Perspective"); Hubbell 2001 Chapter 1; Rosindell *et al*. 2011	Mini-quiz #3;
	Tue	2/5		Journal entry #3
	Wed	2/6	Siepielski *et al*. 2010; Germain *et al*. 2017	
5	Mon	2/11	Chase & Leibold 2001 Chapters 1 & 2; Adler *et al*. 2007	Mini-quiz #4
	Wed	2/12		
6	Mon	2/18	Mittelbach Chapters 7 & 8	Mini-quiz #5
	Tue	2/19		Journal entry #4
	Wed	2/20	Byers 2000; Dybzinski & Tilman 2007	*Exam 1 posted*
7	Mon	2/25	Mittelbach Chapter 5	Mini-quiz #6
	Tue	2/26		Journal entry #5
	Wed	2/27	Terborgh 2015; Condon *et al*. 2014; Godfray 2014	Presentation topic
	Thu	2/28		Exam 1 due
8	Mon	3/4	Mittelbach Chapter 14	Mini-quiz #7
	Tue	3/5		Journal entry #6
	Wed	3/6	Fukami 2018; Srivastava 2018; Tucker & Fukami 2014; Fukami *et al*. 2010	
	Thu	3/7		Presentation proposal
9	3/10–3/16		**No class** – Spring Break	
10	Mon	3/18	Mittelbach Chapter 12 & 13	Mini-quiz #8
	Tue	3/19		Journal entry #7
	Wed	3/20	Ellis *et al*. 2006; Grainger *et al*. 2017	
11	Mon	3/25	Mittelbach Chapter 15	Mini-quiz #9
	Tue	3/26		Journal entry #8
	Wed	3/27	Cornell 2013; Price 2015; Rabosky & Hurlbert 2015; Harmon & Harrison 2015	
12	Mon	4/1	Mittelbach Chapter 3 & 16	Mini-quiz #10
	Tue	4/2		Journal entry #9
	Wed	4/3	Cadotte 2013; Zuppinger-Dingley *et al*. 2014; Tilman & Snell-Rood 2014	
13	Sun	4/7		Journal entry #10
	Mon	4/8	Scheffers *et al*. 2016; Urban *et al*. 2016; Pecl *et al.* 2017	
	Wed	4/10	Presentation workshop	*Exam 2 posted*
14	Mon	4/15		Student presentations
	Wed	4/17		Student presentations
	Thu	4/18		Exam 2 due
15	Mon	4/22		Class presentations
	Wed	4/24		Class presentations

Reading List: Community Ecology (Bio 419) – Spring 2019 (Updated Mar. 24, 2019)*
***Notes**: The schedule, reading assignments and due dates are subject to change.

Week 1: The theory of ecological communities I

Mittelbach, G. G. 2012. Community Ecology. Sinauer Associates, Sunderland, MA.

- Read Chapter 1, *Community Ecology's Roots*, Pages 1–10.

Vellend, M. 2010. Conceptual synthesis in community ecology. *Quarterly Review of Biology* 85:183–206.

Want to learn more? Optional readings:

Agrawal, A. A., D. D. Ackerly, F. Adler, A. E. Arnold, C. Caceres, D. F. Doak, E. Post, P. J. Hudson, J. Maron, K. A. Mooney, M. Power, D. W. Schemske, J. Stachowicz, S. Strauss, M. G. Turner, and E. Werner. 2007. Filling key gaps in population and community ecology. *Frontiers in Ecology and the Environment* 5:145–152.

Courchamp, F., and C. J. A. Bradshaw. 2017. 100 articles every ecologist should read. *Nature Ecology and Evolution* doi:10.1038/s41559-017-0370-9

Levin, Simon A., Stephen R. Carpenter, H. Charles J. Godfray, Ann P. Kinzig, Michel Loreau, Jonathan B. Losos, Brian Walker & David S. Wilcove (eds). 2010. *The Princeton Guide to Ecology*. Princeton University Press, Princeton, NJ.

Magurran, Anne E. & Brian J. McGill (eds). 2011. *Biological Diversity: Frontiers in Measurement and Assessment.* Oxford University Press, Oxford, U.K.

Real, Leslie A. & James H. Brown (eds). 1991. *Foundations of Ecology: Classic Papers with Commentaries*. University of Chicago Press, Chicago, IL.

Sutherland, W., R. Freckleton, H. C. J. Godfray, S. R. Beissinger, T. Benton, D. D. Cameron, Y. Carmel, D. A. Coomes, T. Coulson, M. C. Emmerson, R. S. Hails, G. C. Hays, D. J. Hodgson, M. J. Hutchings, D. Johnson, J. P. G. Jones, M. J. Keeling, H. Kokko, W. E. Kunin, X. Lambin, O. T. Lewis, Y. Malhi, N. Mieszkowska, E. J. Milner-Gulland, K. Norris, A. B. Phillimore, D. W. Purves, J. M. Reid, D. C. Reuman, K. Thompson, J. M. J. Travis, L. A. Turnbull, D. A. Wardle, and T. Wiegand. 2013. Identification of 100 fundamental ecological questions. *Journal of Ecology* 101:58–67.

Vellend, Mark. 2016. *The Theory of Ecological Communities*. Princeton University Press, Princeton, NJ.

Week 2: The theory of ecological communities II

Brooker, R. W., R. M. Callaway, L. A. Cavieres, Z. Kikvidze, C. J. Lortie, R. Michalet, F. I. Pugnaire, A. Valiente-Banuet, and T. G. Whitham. 2009. Don't Diss Integration: A Comment on Ricklefs's Disintegrating Communities. *The American Naturalist* 174:919–927.

Ricklefs, R. E. 2008. Disintegration of the ecological community. *The American Naturalist* 172:741–750.

Ricklefs, R. E. 2009. A Brief Response to Brooker et al.'s Comment. *The American Naturalist* 174:928–931.

Vellend, M. 2010. Conceptual synthesis in community ecology. *Quarterly Review of Biology* 85:183–206.

Want to learn more? Optional readings:

Chave, J. E. 2013. The problem of pattern and scale in ecology: what have we learned in 20 years? *Ecology Letters* 16:4–16.

Lawton, J. H. 1999. Are there general laws in ecology? *Oikos* 84:177–192.

Levin, S. A. 1992. The problem of pattern and scale in ecology: the Robert H. MacArthur Award lecture. *Ecology* 73:1943–1967.

Simberloff, D. 2004. Community ecology: is it time to move on? *American Naturalist* 163:787–799.

Week 3: Ecological drift & dispersal I

Mittelbach, G. G. 2012. Community Ecology. Sinauer Associates, Sunderland, MA.

- Read Chapter 2, *Patterns of Biological Diversity*, Pages 13–40.

Powell, K. I., J. M. Chase, and T. M. Knight. 2013. Invasive plants have scale-dependent effects on diversity by altering species-area relationships. *Science* 339:316–318.

Wagner, C. E., L. J. Harmon, and O. Seehausen. 2014. Cichlid species-area relationships are shaped by adaptive radiations that scale with area. *Ecology Letters* 17:583–92.

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Want to learn more? Optional readings:

MacArthur, R. H. & Wilson, E. O. 1963. An equilibrium theory of insular zoogeography. *Evolution* 17: 373–387.

Patiño, J., R. J. Whittaker, P. A. V. Borges, J. M. Fernández-Palacios, C. Ah-Peng, M. B. Araújo, S. P. Ávila, P. Cardoso, J. Cornuault, E. J. de Boer, L. de Nascimento, A. Gil, A. González-Castro, D. S. Gruner, R. Heleno, J. Hortal, J. C. Illera, C. N. Kaiser-Bunbury, T. J. Matthews, A. Papadopoulou, N. Pettorelli, J. P. Price, A. M. C. Santos, M. J. Steinbauer, K. A. Triantis, L. Valente, P. Vargas, P. Weigelt, and B. C. Emerson. 2017. A roadmap for island biology: 50 fundamental questions after 50 years of The Theory of Island Biogeography. *Journal of Biogeography* 44:963–983.

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Week 4: Ecological drift & dispersal II

Germain, R. M., S. Y. Strauss, and B. Gilbert. 2017. Experimental dispersal reveals characteristic scales of biodiversity in a natural landscape. *Proceedings of the National Academy of Sciences* 114:4447–4452.

Hubbell, S. P. 2001. The Unified Neutral Theory of Biodiversity and Biogeography. Princeton University Press, NJ.

- Read Chapter 1, *MacArthur and Wilson's Radical Theory*, Pages 3–29.

Mittelbach, G. G. 2012. Community Ecology. Sinauer Associates, Sunderland, MA.

- Read Pages 276–283 ("The Neutral Perspective") in Chapter 13, *Metacommunities and the Neutral Theory*.

Siepielski, A. M., K.-L. Hung, E. E. B. Bein, and M. A. McPeek. 2010. Experimental evidence for neutral community dynamics governing an insect assemblage. *Ecology* 91:847–857.

Want to learn more? Optional readings:

Clark, J. S. 2009. Beyond neutral science. *Trends in Ecology & Evolution* 24:8–15.

Hubbell, S. P. 1979. Tree dispersion, abundance, and diversity in a tropical dry forest. *Science* 203: 1299–1309.

Rosindell, J., S. Hubbell, F. He, and L. Harmon. 2012. The case for ecological neutral theory. *Trends in Ecology & Evolution* 27:203–208.

Vellend, M., D. S. Srivastava, K. M. Anderson, C. D. Brown, J. E. Jankowski, E. J. Kleynhans, N. J. B.

Kraft, A. D. Letaw, A. A. M. Macdonald, J. E. Maclean, I. H. Myers-Smith, A. R. Norris, and X. Xue. 2014. Assessing the relative importance of neutral stochasticity in ecological communities. *Oikos* 123:1420–1430.

Week 5: Selection in ecological communities I

Adler, P.B., J. HilleRisLambers & J.M. Levine. 2007. A niche for neutrality. *Ecology Letters* 10:95–104.

Chase, J. A., and M. A. Leibold. 2001. *Ecological Niches: Linking Classical and Contemporary Approaches*. The University of Chicago Press, Chicago.

- Read Chapter 1, *Introduction: History, Context and Purpose*, Pages 1–18.
- Read Chapter 2, *Revisiting the Niche Concept: Definitions and Mechanistic Models*, Pages 19–45.

Want to learn more? Optional readings:

Chase, J. M., and J. A. Myers. 2011. Disentangling the importance of ecological niches from stochastic processes across scales. *Philosophical Transactions of the Royal Society B* 366:2351–2363.

Chesson, P. 2000. Mechanisms of maintenance of species diversity. *Annual Review of Ecology and Systematics* 31:343–366.

Connell, J. H. 1978. Diversity in tropical rain forests and coral reefs. *Science* 199:1302–1310.

Holt, R. D. 2009. Bringing the Hutchinsonian niche into the 21st century: Ecological and evolutionary perspectives. *Proceedings of the National Academy of Sciences* 106:19659–19665.

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Hutchinson, G. E. 1959. Homage to Santa Rosalia or why are there so many kinds of animals? *The American Naturalist* 93:145–159.

Levine, J. M., and J. HilleRisLambers. 2009. The importance of niches for the maintenance of species diversity. *Nature* 461:254–257.

Week 6: Selection in ecological communities II

Mittelbach, G. G. 2012. Community Ecology. Sinauer Associates, Sunderland, MA.

- Read Chapter 7, *Interspecific Competition: Simple Theory*, Pages 125–147.
- Read Chapter 8, *Competition in Nature: Empirical Patterns and Tests of Theory,* Pages 149–173.

Byers, J. 2000. Competition between two estuarine snails: implications for invasions of exotic species. *Ecology* 81:1225–1239.

Dybzinski, R., and D. Tilman. 2007. Resource use patterns predict long-term outcomes of plant competition for nutrients and light. The American Naturalist 170:305–318.

Want to learn more? Optional readings:

Connell, J. H. 1961. The influence of interspecific competition and other factors on the distribution of the barnacle *Chthamalus stellatus*. Ecology 42:710–743.

Connell, J. H. 1980. Diversity and the coevolution of competitors, or the ghost of competition past. *Oikos* 35:131–138.

MacArthur, R. H. 1958. Population Ecology of Some Warblers of Northeastern Coniferous Forests. *Ecology* 39:599–619.

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Week 7: Selection in ecological communities III

Mittelbach, G. G. 2012. Community Ecology. Sinauer Associates, Sunderland, MA.

- Read Chapter 5, *The Fundamentals of Predator-Prey Interactions*, Pages 83–102.

Condon, M. A., S. J. Scheffer, M. L. Lewis, R. Wharton, D. C. Adams, and A. A. Forbes. 2014. Lethal interactions between parasites and prey increase niche diversity in a tropical community. *Science* 343:1240–1244.

Godfray, H. C. J. 2014. Society, where none intrudes. *Science* 343:1213–124.

Terborgh, J. W. 2015. Toward a trophic theory of species diversity. *Proceedings of the National Academy of Sciences* 112:11415–11422.

Want to learn more? Optional readings:

Hairston, N. G., F. Smith F., and L. Slobodkin. 1960. Community structure, population control, and competition. *The American Naturalist* 94: 421–425.

Holt, R. D. 1977. Predation, apparent competition, and the structure of prey communities. Theoretical *Population Biology* 12:197–229.

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Janzen, D. H. 1970. Herbivores and the number of tree species in tropical forests. *The American Naturalist* 104:501–528.

Paine, R. 1966. Food web complexity and species diversity. *The American Naturalist* 100:65–75.

Week 8: Selection in ecological communities IV

Mittelbach, G. G. 2012. Community Ecology. Sinauer Associates, Sunderland, MA.

- Read Chapter 14, *Species Coexistence in Variable Environments*, Pages 289–315.

Fukami, T. 2018. Messy communities: the arising researcher. *Bulletin of the Ecological Society of America* 99: 58–59.

Srivastava, D.S. 2018. Messy communities: the established researcher. *Bulletin of the Ecological Society of America* 99: 59–60.

Tucker C. M., and T. Fukami. 2014. Environmental variability counteracts priority effects to facilitate species coexistence: evidence from nectar microbes. *Proceedings of the Royal Society B: Biological Sciences* 281: 20132637.

Fukami, T., I. A. Dickie, J. P. Wilkie, B. C. Paulus, D. Park, A. Roberts, P. K. Buchanan, and R. B. Allen. 2010. Assembly history dictates ecosystem functioning: evidence from wood decomposer communities. *Ecology Letters* 13: 675–684.

Want to learn more? Optional readings:

Fukami, T. 2015. Historical contingency in community assembly: integrating niches, species pools, and priority effects. *Annual Review of Ecology, Evolution, and Systematics* 46: 1–23.

Week 10: Dispersal, selection, and drift in metacommunities

Mittelbach, Gary G. 2012. Community Ecology. Sinauer Associates, Sunderland, MA.

- Read Chapter 12, *Patchy Environments, Metapopulations, and Fugitive Species*, Pages 251–266.
- Read Chapter 13, *Metacommunities and Neutral Theory*, Pages 267–285.

Ellis, A. M., L. P. Lounibos, and M. Holyoak. 2006. Evaluating the long-term metacommunity dynamics of tree hole mosquitoes. *Ecology* 87:2582–2590.

Grainger, T. N., R. M. Germain, N. T. Jones, and B. Gilbert. 2017. Predators modify biogeographic constraints on species distributions in an insect metacommunity. *Ecology* 98:851–860.

Want to learn more? Optional readings:

Hanski, I. 1998. Metapopulation dynamics. *Nature* 396:41–49.

Leibold, M. A., M. Holyoak, N. Mouquet, P. Amarasekare, J. M. Chase, M. F. Hoopes, R. D. Holt, J. B. Shurin, R. Law, D. Tilman, M. Loreau, and A. Gonzalez. 2004. The metacommunity concept: a framework for multi-scale community ecology. *Ecology Letters* 7:601–613.

Levin, S. A., and R. T. Paine. 1974. Disturbance, patch formation, and community structure. *Proceedings of the National Academy of Sciences* 71:2744–2747.

Logue, J. B., N. Mouquet, H. Peter, and H. Hillebrand. 2011. Empirical approaches to metacommunities: a review and comparison with theory. *Trends in Ecology & Evolution* 26:482–91.

Week 11: Speciation & species pools

Mittelbach, Gary G. 2012. Community Ecology. Sinauer Associates, Sunderland, MA.

- Read Chapter 15, *Evolutionary Community Ecology*, Pages 317–338.

Cornell, H. V. 2013. Is regional species diversity bounded or unbounded? *Biological Reviews* 88:140–165.

Harmon, L. J., and S. Harrison. 2015. Species Diversity Is Dynamic and Unbounded at Local and Continental Scales. *The American Naturalist* 185:584–593.

Price, T. 2015. The Debate on Determinants of Species Richness. *The American Naturalist* 185:571.

Rabosky, D. L., and A. H. Hurlbert. 2015. Species Richness at Continental Scales Is Dominated by Ecological Limits. *The American Naturalist* 185:572–583.

Want to learn more? Optional readings:

Cavender-Bares, J., K. H. Kozak, P. V. A. Fine, and S. W. Kembel. 2009. The merging of community ecology and phylogenetic biology. *Ecology Letters* 12:693–715.

Cornell, H. V, and S. P. Harrison. 2014. What Are Species Pools and When Are They Important? *Annual Review of Ecology, Evolution, and Systematics* 45:45–67.

Ricklefs, R. E. 1987. Community diversity - Relative roles of local and regional processes. *Science* 235:167–171.

Schluter, D., and M. W. Pennell. 2017. Speciation gradients and the distribution of biodiversity. *Nature* 546:48–55.

Webb, C. O., D. D. Ackerly, M. A. McPeek, and M. J. Donoghue. 2002. Phylogenies and community ecology. *Annual Review of Ecology and Systematics* 33:475–505.

Week 12: Biodiversity & ecosystem functioning

Mittelbach, Gary G. 2012. Community Ecology. Sinauer Associates, Sunderland, MA.

- Read Chapter 3, *Biodiversity and Ecosystem Functioning*, Pages 41–62.
- Read Chapter 16, *Some Concluding Remarks and a Look Ahead*.

Cadotte, M. W. 2013. Experimental evidence that evolutionarily diverse assemblages result in higher productivity. *Proceedings of the National Academy of Sciences* 110: 8996–9000.

Tilman, D., and E. C. Snell-Rood. 2014. Diversity breeds complementarity. *Nature* 515:44–45.

Zuppinger-Dingley, D., B. Schmid, J. S. Petermann, V. Yadav, G. B. De Deyn, and D. F. B. Flynn. 2014. Selection for niche differentiation in plant communities increases biodiversity effects. *Nature* 515:108–111.

Want to learn more? Optional readings:

Cardinale, B. J., J. E. Duffy, A. Gonzalez, D. U. Hooper, C. Perrings, P. Venail, A. Narwani, G. M. Mace, D. Tilman, D. a. Wardle, A. P. Kinzig, G. C. Daily, M. Loreau, J. B. Grace, A. Larigauderie, D. S. Srivastava, and S. Naeem. 2012. Biodiversity loss and its impact on humanity. Nature 486:59–67.

Naeem, S., L. J. Thompson, S. P. Lawler, J. H. Lawton, and R. M. Woodfin. 1994. Declining biodiversity can alter the performance of ecosystems. *Nature* 368:734-737

Srivastava, D. S., and M. Vellend. 2005. Biodiversity-ecosystem function research: is it relevant to conservation? *Annual Review of Ecology, Evolution and Systematics* 36:267–294.

Tilman, D., D. Wedin, and J. Knops. 1996. Productivity and sustainability in influenced by biodiversity in grassland ecosystems. *Nature* 379:718–720.

Tilman, D., F. Isbell, and J. M. Cowles. 2014. Biodiversity and ecosystem functioning. *Annual Review of Ecology, Evolution, and Systematics* 45:471-493.

Week 13: Community ecology in the Anthropocene

Mittelbach, Gary G. 2012. Community Ecology. Sinauer Associates, Sunderland, MA.

- Review pages 52–54 in Mittelbach Chapter 3, *Biodiversity and Ecosystem Functioning*.

Pecl, G. T., M. B. Araújo, J. D. Bell, J. Blanchard, T. C. Bonebrake, I.-C. Chen, T. D. Clark, R. K. Colwell, F. Danielsen, B. Evengård, L. Falconi, S. Ferrier, S. Frusher, R. A. Garcia, R. B. Griffis, A. J. Hobday, C. Janion-Scheepers, M. A. Jarzyna, S. Jennings, J. Lenoir, H. I. Linnetved, V. Y. Martin, P. C. McCormack, J. McDonald, N. J. Mitchell, T. Mustonen, J. M. Pandolfi, N. Pettorelli, E. Popova, S. A. Robinson, B. R. Scheffers, J. D. Shaw, C. J. B. Sorte, J. M. Strugnell, J. M. Sunday, M.-N. Tuanmu, A. Vergés, C. Villanueva, T. Wernberg, E. Wapstra, S. E. Williams. 2017. Biodiversity redistribution under climate change: impacts on ecosystems and human well-being. *Science* 355:eaai9214.

Scheffers, B. R., L. De Meester, T. C. L. Bridge, A. A. Hoffmann, J. M. Pandolfi, R. T. Corlett, S. H. M. Butchart, P. Pearce-Kelly, K. M. Kovacs, D. Dudgeon, M. Pacifici, C. Rondinini, W. B. Foden, T. G. Martin, C. Mora, D. Bickford, and J. E. M. Watson. 2016. The broad footprint of climate change from genes to biomes to people. *Science* 354:aaf7671.

Urban, M. C., G. Bocedi, A. P. Hendry, J.-B. Mihoub, G. Peer, A. Singer, J. R. Bridle, L. G. Crozier, L. De Meester, W. Godsoe, A. Gonzalez, J. J. Hellmann, R. D. Holt, A. Huth, K. Johst, C. B. Krug, P. W. Leadley, S. C. F. Palmer, J. H. Pantel, A. Schmitz, P. A. Zollner, and J. M. J. Travis. 2016. Improving the forecast for biodiversity under climate change. *Science* 353:aad8466.

Want to learn more? Optional readings:

McGill, B. J., M. Dornelas, N. J. Gotelli, and A. E. Magurran. 2014. Fifteen forms of biodiversity trend in the Anthropocene. *Trends in Ecology & Evolution* 30:104–113.

Parmesan, C., and G. Yohe. 2003. A globally coherent fingerprint of climate change impacts across

natural systems. *Nature* 421:37–42.
Tilman, D., R. M. May, C. L. Lehman, and M. A. Nowak. 1994. Habitat Destruction and the Extinction Debt. *Nature* 371:65–66.
Vitousek, P. M. 1994. Beyond global warming: ecology and global change. *Ecology* 75:1861–1876.
Vitousek, P. M., H. A. Mooney, J. Lubchenco, and J. M. Melillo. 1997. Human domination of Earth's ecosystems. *Science* 277:494–499.