Section 1
Instructor, Course Information & Objectives

Advanced Academic Programs
Zanvyl Kreiger School of Arts and Sciences
Johns Hopkins University

Landscape Ecology and AS.420.639.81

Instructor Information
Instructor: Kimberly Gardner
Telephone Number: (919) (999-0191)
Email Address: kvest3@jhu.edu
Office Hours: You can reach me by email anytime

Course Description
Landscape ecology is a rapidly developing area of study that explicitly examines the effects of spatial pattern and scale on ecological processes that unfold over areas of several square kilometers or larger. Thus, landscape ecology provides many concepts, tools, and approaches that will enhance the effectiveness of endeavors such as watershed management, ecosystem management, design of conservation reserves and green infrastructure, and smart growth. The goal of this course is to give students a firm grasp of the concepts of landscape ecology and of how they can be applied to enhance the effectiveness of environmental policy, management, regulation, and assessment. Uses of discussions, case studies, computer models, and a virtual field trip help to examine and apply concepts. Offered online at least every other year.

Prerequisite: 420.611 Principles and Methods of Ecology, equivalent course, or experience.

Course Goals & Learning Objectives
The goal of this course is to give students a firm grasp of the concepts of landscape ecology and of how these concepts can be applied to enhance the effectiveness of environmental policy, assessment, and management.

- Given the pros and cons of different landscape pattern metrics, the student will be able to choose which pattern metrics best explain the degree of habitat fragmentation in their landscape, by examining landscape pattern using different landscape metrics in laboratory 1.

- Given the definitions and concepts associated with landscape scaling, the student will be able to choose the correct scale to analyze their landscape and make predictions across the scales through the article discussions, activity blogs, and mid-term exam.

- Given concepts and examples behind landscape connectivity, the student will be able to determine which landscape connectivity measurement is best used on their landscape. The student in laboratory 2 will demonstrate how different landscape connectivity measurements
change the connectivity in a landscape, and in laboratory 4, the student will demonstrate their ability to use a landscape connectivity measurement to design a nature reserve.

- Given the concepts, examples and definitions behind landscape disturbances, the student will be able to explain the connection between disturbance and biodiversity through the article discussion, activity blogs, and mid-term exam.

- Given the definitions of different landscape models, the student will be able to describe the different stages of model development, evaluate the different models, understand the difference between spatially explicit and implicit, and understand the importance of models in landscape ecology through article discussion, activity blogs, and analyzing landscape change over time using a simple Markov model in laboratory 3.

- Given the explanation of metapopulations in a landscape, students will be able to identify a metapopulation in a landscape, determine whether the metapopulation is connected, and decide which metapopulations need to be conserved through an activity of designing a nature reserve using landscape connectivity and metapopulation dynamics in laboratory 4.

- Given the different concepts of landscape ecology: scale, pattern metrics, disturbance, modeling, connectivity, and metapopulations, the student will be able to apply the scientific method to determine which different methods of landscape monitoring and ecosystem management would work best on their landscape through article discussion, activity blogs, final exam, and class project.
Section 2
Course Materials

Textbook/s
Required

Other Readings


Other equipment / software/ websites / online resources
- E-Reserves; Any computer with Microsoft office system, current is better; VIMEO; flickr; Blackboard

Specific Technology Requirements for this Course
- This course requires the use of a computer that complies with the following hardware specifications: has Microsoft word and excel or a similar program.

Learning online requires some basic knowledge of computer technology. At a minimum, you need to be able to:
- Navigate in and use Blackboard; the Blackboard Student Orientation course on your “My Institution” page
- Create and save MS Word documents; see MS Word training and tutorials for PC users (all versions); Word Help for Mac users
- Find basic resources on the Internet
- Create and organize files & folders on your computer
- Send, receive, and manage email
Section 3

About Your Course

Course Topics

- **Week 1**: Landscape Ecology; What is it? A preview
- **Week 2**: Quantifying Landscape Pattern: Habitat Loss and Fragmentation
- **Week 3**: Scaling; Spatial and Temporal Scales of Ecological Events
- **Week 4**: Landscape Pattern; Connectivity, Dispersal, and Species Invasion
- **Week 5**: Disturbance Regimes
- **Week 6**: Primer on Landscape Models; Neutral Models
- **Week 7**: Midterm Exam
- **Week 8**: Relating Pattern and Process; Markov Models; Spatial Dynamics
- **Week 9**: Spatial Statistics
- **Week 10**: Organism and Landscape Pattern, Metapopulations; Conservation
- **Week 11**: Strategies for Landscape Analysis; Ecosystem Processes; Genetics
- **Week 12**: Restoration of Invaded Landscapes
- **Week 13**: Virtual Field Trip; Current natural disasters and Landscape Ecology
- **Week 14**: Presentation and Press Release; Final Exam

Directions for Students

**Next Steps**: Carefully review the remaining sections of the syllabus before beginning the Lesson 1/Week1/Landscape Ecology; What is it?

- Once you feel that you are ready to dive into the first week’s activities, click on the Lessons button on the left-side navigation menu. Then, Click on Lesson 1/Week 1/Landscape Ecology; What is it? A preview to begin with the Introduction and Objectives.

What to Expect in this Course

This course is 14 weeks in length (excluding Spring Break) and includes individual, group, and whole group activities in a weekly cycle of instruction. Each week begins on a Monday and ends on the following Sunday at midnight. Please review the course syllabus thoroughly to learn about specific course outcomes and requirements.

Each week, you will complete readings that may include videos, multimedia presentations, web-based resources, and articles from professional journals. A reading may be integrated within an activity during the week or provide some key information to assist your learning.

In this course, you will also experience online learning activities, which include discussion boards, group work, and online multimedia presentations.

Be sure to refer to the Checklist each week, which provides a week-at-a-glance and shows targeted dates for the completion of activities.
Course Structure

Each week the course will cover a new topic. The lecture will be composed of five, 20 minute segments each week followed by the discussion of two to three landscape ecology articles (classic and contemporary) and a class activity. The course will also involve a series of laboratory exercises, completed individually or in small groups, with independently submitted write-ups. The first half of the course will give you the tools to analyze landscape ecology concepts. The second half of the course will focus on using these tools for landscape management.
Section 4

Assessments and Grading Policy

Assignments

**Lab Reports:** A series of four lab exercises will be performed requiring familiarity and access to a PC. Written reports will be required for each of the exercises.

**Special Project:** Students will write a press release (1000 words) for their landscape ecology concept and make a 15 minute presentation over a concept of landscape ecology in your surrounding area.

**Exams:** A midterm exam and a final exam will be administered. The midterm will be take-home and open-book. The final exam will be take-home and open-book. The final will be cumulative covering all material in the course.

**Class Participation:** Class participation will be evaluated primarily on discussion of the readings, and weekly activity blogs. Each student will have the opportunity to lead the class discussion of assigned weekly readings. All students will have read the papers prior to commenting on the discussion, so discussion leader(s) should not provide a detailed review of the paper. The discussion leader(s) should provide a brief summary of the main topic of the paper, just to remind everyone of which paper is being considered. Here are some tips for being effective at leading discussion.

I. Summarize for yourself some of the important points about the paper. It’s often useful to have a set of questions that you answer while planning discussion. For example, consider the following: What is the main conceptual contribution of the paper? Why might it be important of influential? Is it a representative example? Does it propose a new direction or idea? How does this paper relate to other papers or general concepts with which you are familiar? Are there any new approaches represented? Are there any problems with the study? How does this reflect the current state of the science?

II. Prepare in advance some open-ended questions that you can pose to the group to get the discussion going. Remember that questions with a “yes” or “no” answer do not facilitate a discussion! Feel free to call on people if no one is responding on the discussion board.

III. Keep the discussions moving by including all members of the group and by curtailing discussion that goes off into tangents or dead ends.

IV. Try to summarize and synthesize as things go along. It’s often helpful to use a mechanism like, “So far, we’ve identified the following main contributions of this paper: …

Participating in Discussion: Discussions are only effective for all when everyone is prepared and has perspectives to contribute. Everyone is expected to have read the assignment before class and given thought to the paper’s content and context. A good strategy for being prepared is to write down a couple of questions or observations about each paper as you are reading it. This class benefits tremendously from the diverse interests and backgrounds of the students, and we all learn a lot by listening to each other.
Activities: After each class, there will be a learning activity over the concepts discussed in class. These activities are mandatory, and they will help you gain a better understanding of the subject matter. Each week I will set-up a blog over the learning activity topic, and you will be required to blog about what you learned and how it applies to the class lecture. The blog entries will count towards your class participation grade.

Field Trip: A virtual field trip to Antietam National Battlefield Park will provide the opportunity to learn about natural resource management issues and landscape monitoring programs for the National Parks with historical significance. Each student will be required to blog about what you learned from the field trip and insights you gained. The blog will count towards your participation grade.

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<tr>
<th>Assignments</th>
<th>Due Dates</th>
<th>Points Possible</th>
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<tr>
<td>Lab Reports (4):</td>
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<td>Lab 1: Landscape Metrics - The analyses and comparison of landscape pattern requires two things: 1) a clearly stated, testable question; and 2) quantitatively robust methods to address that question (Gardner and Urban 2006). Three exercises are performed in this lab: The first provides familiarity with the surprising degree of structure present in simple random models; the second assesses the change in structure as a result of a change in the scale of analysis; and the third exercise evaluates a real landscape against two alternative hypotheses.</td>
<td>TBD</td>
<td>Lab 1: 6.25</td>
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<td>Lab 2: Network Analysis and Connectivity - This lab introduces fundamental concepts of network analysis and graph theory, specifically how they relate to quantification of habitat connectivity within fragmented landscapes. You will gain hands on experience analyzing landscapes and understanding them as “networks”, which are analyzed using graph theory.</td>
<td>TBD</td>
<td>Lab 2: 6.25</td>
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<td>Lab 3: Markov Model - This lab will introduce the fundamental concepts of Markov modeling; provide hands-on experience with estimating the parameters of the model; apply the Markov approach to practical landscape issues; and investigate possible extensions beyond the “first-order” processes typically modeled with Markov methods.</td>
<td>TBD</td>
<td>Lab 3: 6.25</td>
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<td>Lab 4: Nature Reserve - The goal of the exercise is to explore a range of strategies for assembling a portfolio of reserves. This is done by using iterative algorithms for selecting sites. Specifically, you will assemble portfolios using three different</td>
<td>TBD</td>
<td>Lab 4: 6.25</td>
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selection algorithms, two emphasizing ecological diversity or uniqueness and one emphasizing potential viability. As these might result in quite different portfolios, the challenge is to devise a site selection process that achieves a balance of the selection criteria.

Assignment 2: Midterm Exam
TBD 15

Assignment 3: Special Project - For the final project you will be writing a 500 word press release about a concept in landscape ecology and your local area. You will also compile a 15-minute PowerPoint or other similar software presentation over your press release.
TBD 15

Assignment 4: Course Engagement
You are expected to have an active presence in course discussions, and complete course activities as noted in the assignment guidelines to maximize your learning. Participation in activities should be consistent, of high quality, and reflect both a high level of academic thinking and your own personal perspectives, opinion, and ideas.
Weekly (See discussion and blog directions) 25

Assignment 5: Final Exam
TBD 20

Total 100

Grading
Students will turn in their own work. You may work together on class assignments; however, you may not work together on mid-term or final exams. Extra credit is not available. Late work without prior notification will be minus 10% per day late. Missing assignments without prior notification will receive zero points. Participation grades are assessed by rubrics that are available with each discussion and blog.

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<tr>
<th>Letter Grade</th>
<th>Percentage</th>
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<tr>
<td>A+</td>
<td>98% to 100%</td>
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<td>A</td>
<td>94% and less than 98%</td>
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<tr>
<td>A-</td>
<td>90% and less than 94%</td>
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<tr>
<td>B+</td>
<td>88% and less than 90%</td>
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<tr>
<td>B</td>
<td>84% and less than 88%</td>
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<td>B-</td>
<td>80% and less than 84%</td>
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<tr>
<td>C</td>
<td>70% and less than 80%</td>
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<tr>
<td>F</td>
<td>0% and less than 70%</td>
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</table>
Assignment Guidelines

All written assignments should be in Arial 11 with 1.1 spacing. When submitting your work, please put your last name followed by the title of the assignment (e.g., Gardner_Lab4.docx). Please submit your assignment in the Assignment section of the blackboard course. If you are having trouble submitting the assignment to blackboard, please email the assignment to kvest3@jhu.edu. Assignments and blogs are due by Sunday at midnight. Discussion threads have their own due dates. Please see the discussion section in the blackboard course for more details.

Assignments, discussions, and blogs will be graded within 5-7 days following the due date, depending on the length of the assignment. You will receive feedback under the My Grades link in the left-hand menu of your course.

You are expected to contact your instructor in advance if you think you cannot meet an assignment deadline. However, if an assignment is late and prior arrangements have not been made with the instructor, the assignment score will be minus 10% for each day late.

Time Management Expectations

What is the time demand and schedule of the course?

Because this is a graduate-level course that is offered in a condensed format, the rigor and time commitment is higher than a traditional 14-week semester course. It is expected that you look ahead to schedule your time. Plan to complete coursework across several days of the week rather than all in one day. Be sure to consider how group activities impact your schedule as well.

Some assignments require that you work on them for multiple weeks. Be sure to review the assignment directions at the beginning of the course so that you can plan your time accordingly. Please seek help before becoming frustrated and spending a significant amount of time to resolve an issue.
Section 5  
Course Participation & Communication Policy

Participation

What are the participation requirements?
You are expected to log into Blackboard at least three times a week, though a daily check-in is recommended. It is your responsibility to read all announcements and discussion postings within your assigned forums. You should revisit the discussion multiple times over the week to contribute to the dialogue.

Network Etiquette (i.e. “Netiquette”)
In this course, online discussion will be primarily take place in our online discussion board. In all textual online communication it's important to follow proper rules of netiquette.

What is netiquette? Simply stated, it's network etiquette -- that is, the etiquette of cyberspace. And "etiquette" means the social and cultural norms of communicating with others in a proper and respectful way. In other words, netiquette is a set of rules for behaving and interacting properly online.

The Netiquette “Core Rules” linked below are a set of general guidelines for cyberspace behavior. They probably won't cover all situations, but they should give you some basic principles to use in communicating online.

For Netiquette Core Rules visit The Core Rules of Netiquette web page.

Contacting the Instructor

The instructor for this course is Kimberly Gardner (kvest3@JHU.edu)  
Feel free to contact your instructor with comments, questions, and concerns. You will receive a response within 24-48 hours.

All email messages will be sent to you via your JHU email account, so you should be in the habit of checking that account every day or you should ensure that your JHU email account forwards messages to another account of your choice.)
Section 6
Course Protocols

Course Protocols

How will I know about changes to the course?
Frequently, you will find new announcements posted in the Announcements, which contain information about current course activities that you are working on and any changes to the course. Please check announcements every time that you log into your online course.

How should I communicate with others in this course?
You should communicate often with your classmates and with your instructor. The majority of communication will take place within the Discussion forums. When you have a question about an assignment or a question about the course, please contact your instructor, or post your question in the course’s “Syllabus & Assignment Question” forum.

Are there any requirements for sending e-mail messages?
When you send an e-mail message to the instructor or to another participant in the course, please observe the following guidelines:

- Include the title of the course in the subject field (e.g., JHU Landscape Ecology).
- Keep messages concise, and check spelling and grammar.
- Send longer messages as attachments.
- Sign your full name (the sender’s email is not always obvious).
**Section 7**  
**Course Topics, Activities & Schedule**

**Tentative Course Schedule**

**Important Note**: Activity and assignment details will be explained in detail within each week's corresponding learning module. If you have any questions, please contact your instructor. This schedule is subject to change with fair notice. I will email you with any changes a week in advance and also edit the syllabus to reflect the change.

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
<th>Activities</th>
<th>Assessments &amp; Due Dates</th>
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<tbody>
<tr>
<td>1</td>
<td>TBD –</td>
<td>Landscape Ecology; What is it? A preview</td>
<td>Article Discussion (Kim)</td>
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<td></td>
<td>TBD</td>
<td>• Scope of Course</td>
<td>• Turner, M.G. 2005. Landscape ecology: What is the state of the science?</td>
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<td></td>
<td></td>
<td>• Key words and concepts</td>
<td>Phillips, J.D. 2007. The perfect landscape. Geomorphology 84: 159-169.</td>
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<td></td>
<td></td>
<td>• Essential landscape issues</td>
<td>Book</td>
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<td></td>
<td></td>
<td>• Background and History</td>
<td>• Chapter 1 (pp. 2-14; pp. 29)</td>
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<td>Activities</td>
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<td>• Learning Activity</td>
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<td>• Podcast</td>
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<td>2</td>
<td>TBD –</td>
<td>Quantifying Landscape Pattern: Habitat Loss and Fragmentation</td>
<td>Article Discussion (TBD)</td>
<td>Handout: Lab 1: Landscape Metrics Due TBD</td>
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<td>• Selection of Pattern Metrics</td>
<td>Book</td>
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<td>• Management Example using Pattern Metrics</td>
<td>• Chapter 2 (pp. 48 – 53)</td>
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<td>• Podcast</td>
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Book  
Chapter 1 (pp. 15-30)  
Activities  
Learning Activity  
Podcast |
|      |       | • Definitions and concepts  
• Empirical and theoretical roots  
• Making predictions across scales | | |
|      |       | • Pattern Process Paradigm and Unit Pattern  
• The Physical Template  
• Landscape Connectivity  
• Euclidean Distance vs Graph Distance | | |
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<th>Activities</th>
<th>Assessments &amp; Due Dates</th>
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| 5    | TBD – TBD | Disturbance Regimes  
• Importance and definition  
• Disturbance scale and regime  
• Simple Disturbance Model  
• Disturbance and Biodiversity | Article Discussion (TBD)  
Book  
• Chapter 2 (pp. 48-55)  
• Chapter 6  
Activities  
• Learning Activity  
• Podcast | Handin: Lab 1: TBD  
Handout: Lab 2: Network Analysis and Connectivity Due TBD |
| 6    | TBD – TBD | Primer on Landscape Models; Neutral Models  
• Definitions, Importance and terms  
• Stages of Model Development  
• Generalities about the modeling process  
• Model Evaluation Importance in Landscape Ecology | Article Discussion (TBD)  
Book  
• Chapter 3 (pp. 75 – 89)  
Activities |
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<th>Assessments &amp; Due Dates</th>
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<tr>
<td>7</td>
<td>TBD –</td>
<td>Midterm Exam – Take Home Exam</td>
<td>• Learning Activity</td>
<td>Midterm</td>
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<td>• Podcast</td>
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<td>8</td>
<td>TBD –</td>
<td>Relating Pattern and Process; Markov Models of Landscape Change; Simulation of Spatial Dynamics</td>
<td>Article Discussion (TBD)</td>
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<td>Book</td>
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<td>• Chapter 3 (pp. 64 – 75)</td>
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<td>Podcast</td>
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<td>TBD –</td>
<td>Spatial Statistics</td>
<td>Article Discussion (TBD)</td>
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<td>Book</td>
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<td>• Chapter 5</td>
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<td>Activities</td>
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Press Releases and presentation TBD |
| 12   | TBD   |        | • Learning Activity  
• Podcast |          |
|      |       |        | Book         | Chapter 8  
Chapter 9 |
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<th>Week</th>
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<td></td>
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<td>landscapes: a Grand Challenge for landscape ecologists? Landscape Ecology 25:5 - 16.</td>
<td>Book • Chapter 10 Activities • Learning Activity • Podcast</td>
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<tr>
<td>13</td>
<td>TBD – TBD</td>
<td>Virtual Field Trip; Current Natural Disasters and Landscape Ecology</td>
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<td>14</td>
<td>TBD</td>
<td>Final Exam</td>
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<td>Exam TBD</td>
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Section 8
University Policies

General
This course adheres to all University policies described in the academic catalog. Please pay close attention to the following policies:

Students with Disabilities
Johns Hopkins University is committed to providing reasonable and appropriate accommodations to students with disabilities. Students with documented disabilities should contact the coordinator listed on the Disability Accommodations page. Further information and a link to the Student Request for Accommodation form can also be found on the Disability Accommodations page.

Ethics & Plagiarism
JHU Ethics Statement: The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Report any violations you witness to the instructor.

Read and adhere to JHU’s Notice on Plagiarism.

Dropping the Course
You are responsible for understanding the university’s policies and procedures regarding withdrawing from courses found in the current catalog. You should be aware of the current deadlines according to the Academic Calendar.

Getting Help
You have a variety of methods to get help. Please consult the help listed in the "Blackboard Help" link in the online classroom for important information. If you encounter technical difficulty in completing or submitting any online assessment, please immediately contact the designated help desk listed on the AAP online support page. Also, contact your instructor at the email address listed atop this syllabus.

Copyright Policy
All course material are the property of JHU and are to be used for the student's individual academic purpose only. Any dissemination, copying, reproducing, modification, displaying, or transmitting of any course material content for any other purpose is prohibited, will be considered misconduct under the JHU Copyright Compliance Policy, and may be cause for disciplinary action. In addition, encouraging academic dishonesty or cheating by distributing information about course materials or assignments which would give an unfair advantage to others may violate AAP’s Code of Conduct and the University’s Student Conduct Code. Specifically, recordings, course materials, and lecture notes may not be exchanged or distributed for commercial
purposes, for compensation, or for any purpose other than use by students enrolled in the class. Other distributions of such materials by students may be deemed to violate the above University policies and be subject to disciplinary action.