Principles of Fisheries Ecology and Management
ENR 5342: Spring 2016
12:40–1:35; M, W, and F; Kottman Hall, rm. 370

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Course description
This course is an introduction to the conceptual elements of inland fisheries management. It will provide fisheries and wildlife majors and graduate students with background information for future courses and the profession. It is also organized to provide useful information to non-majors and graduate students who may not have the opportunity to take additional courses in this field.

Course goals
A. Students will understand the various meanings of the term “fisheries” and what “management” in a fisheries conservation context implies.

B. Students will understand the rate functions that structure exploited aquatic populations.

Learning objectives
1. Students will recognize and define diverse activities and three intersecting study areas as “fisheries” and their management.
2. Students will demonstrate knowledge of the history of fisheries conservation and sport fishing.
3. Students will demonstrate basic knowledge of the biology and ecology of select organisms important to fisheries management in North America.
4. Students will identify common issues associated with different fisheries habitats.

1. Students will identify and define the three rate functions that structure exploited populations and the relationships between them.
2. Students will select appropriate procedures to calculate simple population indices and statistics commonly used by fisheries managers.
3. Students will apply appropriate decision making processes in population manipulation context.
4. Students will demonstrate basic understanding of the application of population functions in fisheries management and conservation contexts.
**Course goals**
C. Students will understand the development, use, and revision of policy/regulation to attain management objectives.

**Learning objectives**
1. Students will define and apply the formal steps associated with policy formulation and assessment.
2. Students will demonstrate knowledge of the regulatory use of aquatic-organism and habitat indices as indicators of ecosystem health.
3. Students will incorporate an appreciation for competing interests in decision-making processes and recognize that compromise is a necessary component of fisheries management.

D. Students will increase the ability to communicate knowledge about this topic matter.

1. Students will explore professional fisheries management literature and evaluate sources using an annotated bibliography.
2. Students will create a professional-style document adhering to a prescribed professional format.
3. Students will evaluate their peers' professional writing in a formal peer-reviewer context.

**Required text**

**Suggested references (NOT required)**

_Fisheries management texts_


Field guides and systematic texts


Student evaluation and grading

<table>
<thead>
<tr>
<th>Assignment/Assessment</th>
<th>Point value</th>
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<tbody>
<tr>
<td>Homework</td>
<td></td>
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<tr>
<td>Fish &amp; wildlife conference</td>
<td>50</td>
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<tr>
<td>Population estimation</td>
<td>50</td>
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<td>Age &amp; growth</td>
<td>50</td>
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<tr>
<td>Relative weight</td>
<td>50</td>
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<tr>
<td>Diet indices</td>
<td>50</td>
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<tr>
<td>Fisheries assessment</td>
<td>50</td>
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<tr>
<td>Writing project</td>
<td></td>
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<tr>
<td>Annotated bibliography</td>
<td>75</td>
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<tr>
<td>Draft term paper</td>
<td>50</td>
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<tr>
<td>Term paper</td>
<td>150</td>
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<tr>
<td>Peer review</td>
<td>75</td>
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<tr>
<td>Exams</td>
<td></td>
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<tr>
<td>Midterm 1</td>
<td>100</td>
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<tr>
<td>Midterm 2</td>
<td>100</td>
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<tr>
<td>Final exam</td>
<td>150</td>
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<td>Total:</td>
<td>1,000</td>
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Your grade will be based on a total of 1,000 points. Understanding that there are different learning styles and that different students excel in different areas, opportunities for student evaluation will be presented in three categories, each comprising an approximate third of the total grade: simple homework calculations, exams, and written assignments. Assignments can be submitted electronically via Carmen or in hard copy. All late assignments will be docked 10% per day. I don’t feel this exorbitant, so exceptions to this policy are almost never granted. Please plan accordingly.

Examinations will be divided between multiple choice and questions requiring short answers or brief essays, lists, definitions, and simple calculations. The final examination will be comprehensive,
requiring an integration of concepts presented throughout the course. Makeup exams will be offered only under extreme circumstances and may consist of oral or essay questions.

Letter grades will be assigned on the four-point system following the university’s standard scheme:

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tr>
<td>A</td>
<td>93.00–100%</td>
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<tr>
<td>A-</td>
<td>90.00–92.99%</td>
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<td>B+</td>
<td>87.00–89.99%</td>
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<tr>
<td>B</td>
<td>83.00–86.99%</td>
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<tr>
<td>B-</td>
<td>80.00–82.99%</td>
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<tr>
<td>C+</td>
<td>77.00–79.99%</td>
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<tr>
<td>C</td>
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<td>C-</td>
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<td>E</td>
<td>&lt; 60.00%</td>
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**Course outline**

**Theme & readings**

**Week 1**

Course introduction, fisheries management

Hubert & Quist (H&Q) Ch. 1, 4, 5, & 6

**Week 2–4**

Introduction to ichthyology and fish ecology

H&Q Ch. 2

**Week 5–6**

Fishery assessments

Assessing anglers and the public  
H&Q Ch. 2, 3, 11, & 14

Assessing fish populations

**Week 7**

Watersheds and lotic habitat management

Describing lotic habitats  
H&Q Ch. 10

Habitat management, degradation, and restoration

**Week 7–8**

Lentic habitat management

Describing lentic habitats  
H&Q Ch. 13

Management of natural and artificial lakes as habitat

**Week 8–9**

Management of introduced fishes

Reasons for fish introductions  
H&Q Ch. 8 & 9

Stocking programs

Evaluations of fish introductions

Aquatic invasive species

**Week 9**

Endangered species management

Laws and implementation  
H&Q Ch. 12

Management for endangered species
Week 10–11  Managing with regulations
Objectives  H&Q Ch. 7 & 12
Types
Regulatory process
Fish assemblages and aquatic communities as regulatory tools

Week 11–12  Conservation and management practices of flowing-water fisheries
Coldwater streams  H&Q Ch. 18, 19, 20, & 21
Warmwater streams
Large rivers

Week 13  Conservation and management practices of impoundment fisheries
Small ponds  H&Q Ch. 16 & 17
Reservoirs

Week 14  Conservation and management of natural-lake fisheries
Basis of fish production  H&Q Ch. 15, 16, & 17
Approaches to lake management
Classes of management problems
Great Lakes fisheries: changes and management setting
<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>1: 9–13 January</td>
<td>Lecture: Fisheries intro.</td>
<td>Lecture: Fisheries history.</td>
<td>Lecture: Fisheries and communications. <strong>Term-paper topics assigned.</strong></td>
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<tr>
<td>6: 13–17 February</td>
<td><strong>Midterm 1.</strong></td>
<td>Lecture: Basic fisheries statistics and indices.</td>
<td>Lecture: Social information and survey data. <strong>Annotated bibliography due.</strong></td>
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<td>7: 20–24 February</td>
<td>Lecture: Watershed and stream habitat management.</td>
<td>Lecture: Reservoir and lake habitat management.</td>
<td>Lecture: State of Ohio lake habitat program. <strong>Conference assignment due.</strong></td>
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<tr>
<td>Break: 13–17 March</td>
<td><strong>Spring break: no classes.</strong></td>
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<tr>
<td>13: 10–14 April</td>
<td>Lecture: Pond fisheries.</td>
<td>Lecture: Reservoir/Impoundment fisheries.</td>
<td>Graduate student research seminars. <strong>Peer review due.</strong></td>
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<td>15: 24 April</td>
<td>Open review session.</td>
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<td>Finals week</td>
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<td><strong>Final exam: Tuesday, 2 May 2017, 12:00–1:45 PM.</strong></td>
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Instructions for annotated bibliography, term paper, and peer review
You will select a unique topic as a subject for your annotated bibliography and for later elaboration in a term paper crafted to emulate a submission to a professional journal. A list of suggested topics follows within this syllabus; however, it’s possible to select any fishery-related topic of personal interest to you. If you would like to choose a topic not included on this list, seek approval from instructional staff to ensure it is not redundant to a topic already selected by somebody else. The bibliography and term paper assignments will be discussed during the first or second week of class. Please note the 10% penalty per working day for late assignments. This will be strictly enforced, so please plan ahead!

Annotated bibliography
An annotated bibliography is a list of references, like those that you include at the end of a term paper. However, instead of just listing the author, publication year, title, etc., you also include the most important findings contained in the article or book that you are referencing.

For this assignment, you will need to locate and read at least eight articles/chapters from at least three different professional journals and books. Both journal articles and books can be represented, but with the emphasis on primary research presented in professional journals: at least ¾ of your references and annotations must be from primary research. You will then provide us with a correct citation of the article/chapter and a brief, three- to five-sentence summary of the content of each. The annotated bibliography must be typed; nothing should be hand-written.

Remember two important things:
• Do not use abstracts alone for these sources; you must locate and read the actual paper or book chapter.
• Paraphrase your sources; do not directly copy another author’s phrases or sentences.

The texts and articles you choose are to deal with the topic of your term paper. Many of the topics provided within this syllabus are too broad to write an effective term paper. Change the scope and your resultant title as necessary to craft a concise and conceptually complete document. If you don’t have some prior familiarity with fisheries, begin your search in books to learn something about your topic (your textbook is a perfectly legitimate start). Move to their indexes and reference lists to find related articles in professional journals. Use scholarly web-based databases to your advantage, mostly to locate scholarly texts and peer-reviewed articles. When you have found an article title that is of interest to you, locate and read the article, making sure to take good notes on content to help you write the annotation. Don't forget to make a complete record of the citation. If available, it’s often a good idea to simply save a pdf of the document for future reference.

Accessing the internet via Ohio State University (OSU) servers will provide you with easy access to a tremendous number of appropriate references through a vast many subscription services maintained by the university. Be certain to format your citations and list of references following the prescribed style of the American Fisheries Society (AFS). If you access journal articles electronically, cite the formal publication in accordance with AFS guidelines, not the web service/site you used to access it. Many subscription services will add a title page to publication downloads that may include a recommendation “To cite this article” or similar; do not simply cut and paste that citation. If formatted differently, you must edit the recommended citation to fit that prescribed by the AFS (note: even the service OSU uses to download AFS journals gives a recommended citation that does not follow the AFS’s prescribed format).

For correct citation style, use the North American Journal of Fisheries Management’s guide for
authors. The complete document can be found in the January 2016 issue (36:207–212) as well as accessed by university machines at http://fisheries.org/books-journals/najfm/najfm-guide-for-authors/. The newest Guide for Authors and A [recent] Guide to AFS Publications Style will also both be posted to Carmen for your reference.

The following is an example of a correct citation and annotation for the article:


Markham et al. (1991) used radio tags in White Crappies *Pomoxis annularis* to determine summer movement patterns and habitat preferences. Fish movement increased at dusk, peaked at night, declined at dawn, and then remained low during the day. Areas most often chosen by crappies were about 5 m deep; had relatively steep slopes; and structure in the form of rocks, stumps, or fallen trees. Fish showed high fidelity to home areas, returning to them each morning after feeding during the evening and nighttime hours. Fishing can be improved for this species by marking favorable locations for anglers as well as by adding structure to improve otherwise good locations.

**Term paper**
The term paper will be written on the same topic used for your annotated bibliography and must also be typed. Although many of the sources used in your annotated bibliography will be used in your paper, some may be left out and additional references should be added.

**Note that there is no requirement for page length**, but my experience has been that it takes approximately 10 pages of narrative (excluding figures, tables, and references) to adequately address a topic to my own (your grader’s) satisfaction. If you’ve managed to generate around 8–12 or more pages and feel you’re conceptually complete, you very well may be; if you’ve generated 3.25 pages, probably not. Your submissions can be electronic or hard copy; electronic submission is preferred. Microsoft Word must be able to open any electronic submissions. Any hard-copy submissions (not required) should be fastened at the upper left corner with a single staple. Do not place between hard or plastic covers.

Do not format your paper to look like a finished publication; it should be formatted like a manuscript submission as prescribed by the posted AFS guide for authors. Many of the formatting expectations (including for section headings, line spacing, line and page numbering, etc.) can be found in the guide for authors under the heading “Manuscript format.” Please ask if any formatting aspect is not clear to you. In the past, I assumed the instructions compiled here, in lectures, and as detailed in AFS support documents would result in correctly formatted and sequenced term papers. Still, not always—perhaps even, often not. Toward that end, here is your concise, sequential (i.e., following the sequence specified below) “recipe” for successful assembly of a term paper for this course:

1. *Title page* (required): Be certain to include a title that is crafted to be descriptive of the finished paper’s content. Also include the author’s name (i.e., yours), affiliation, and professional address (for this purpose, you’re welcome to use that of your major’s department). Be certain to begin numbering pages and each line of text throughout the paper with the title page.
2. **Abstract** (required): Format as a single paragraph of 300 or fewer words that concisely describes the content of the paper. The abstract should be understandable and stand on its own; thus, do not use statements to the effect of “This paper will present [such and such],” etc.

3. **Body** (required): Divide your narrative under relevant headings by conceptual subject. It’s usually a good idea to include an “Introduction” as your first labeled section, concisely stating the background of your topic and why it’s important. Following that, because this course does not include the collection of new field/lab data, your papers are likely to take the form of a “critical review.” This is not necessarily representative of a typical submission to any journal with a focus on primary research. **Thus, the “components” of a “typical manuscript” listed by the guide for authors (“methods,” “results,” etc.) don’t necessarily apply,** although they can if it seems appropriate to you. Feel free to consider examples of other review papers in crafting your content and headers. Three recent, published examples (Stapanian 2010; Bodine et al. 2013; Weltman-Fahs and Taylor 2013) will be posted to Carmen for your consideration.

4. **References** (required): **Every reference requires a citation in your narrative; every in-text citation needs to correspond to an entry in your list of references.** Each entry should be formatted as prescribed by the AFS and previously discussed at length. Your paper should include at least 12 sources (ideally, even more), at least ¾ of which (ideally, even more) should be peer-reviewed, primary research presented in professional journals.

5. **Acknowledgments** (optional): Not likely relevant here, but maybe. Yeah, I love my mother too, but only acknowledge those people or funding sources to have directly contributed to this particular work.

6. **Tables** (optional): Every table should receive a parenthetical citation in your narrative: e.g., “… (Table 1).” The tables themselves should be compiled together following your references. Number each table sequentially in spite of however numbered in its source (the first table you present will be “Table 1”; the second, “Table 2”; etc. even if your source labeled it with some different number). Every table should be headed by a relevant caption that begins with its serial number (e.g., “Table 1.”). The first sentence of the caption should state the contents of the table in a general way. The first sentence does not have to be complete. Subsequent sentences, which do have to be complete, should present the rest of the information that is pertinent to the table as a whole. Unless your tables and their captions are wholly your own original work, newly created for this paper, be certain they are correctly cited (including the caveat “based on…” or “modified from…” if appropriate).

7. **Figures** (optional): Every figure should receive a parenthetical citation in your narrative: e.g., “… (Figure 1).” The figures themselves should be compiled together following your references and any tables. Number each figure sequentially in spite of however numbered in its source (the first figure you present will be “Figure 1”; the second, “Figure 2”; etc. even if your source labeled it with some different number). Every figure should be followed by a relevant caption that begins with its serial number (e.g., “Figure 1.”). The caption’s first sentence does not have to be complete. Subsequent sentences do have to be complete. Unless your figures and their captions are wholly your own original work, newly created for this paper, be certain they are correctly cited (including the caveat “based on…” or “modified from…” if appropriate).

If you have collected field data on a fisheries-related project **that has not previously been submitted for credit within some other course,** you may be able to draft a primary-research-type manuscript to fulfill the requirements of this course. Talk to instructional staff if this applies to you. Your paper would still need to competently address all four points from the grading rubric described below.
The following guidelines will comprise a grading rubric for term papers in this course:

1. **The bulk of points will be awarded for content and formal style considerations (75 pts.):** succinctness, clarity of thought, integration/synthesis of ideas (i.e., several authors’ ideas used to arrive at your own conclusions), demonstrated understanding of course materials, completeness of content, adherence to AFS style guidelines, and correct language mechanics. Use dictionaries, style references/examples, proofreading, and word-processing software to your advantage.

2. **All papers must quantitatively address (a) population rate function(s) or some statistical analysis (30 pts.).** This means that you should support your assertions with numbers—if possible, wherever appropriate, including reference to hypothesis tests and associated numeric statistics (for purposes of this course, this is in slight contrast to the AFS style guide)—and correct citations for the sources of those numbers.

3. **Specifically address how the topic relates to or affects resource management and/or regulation/policy (30 pts.).**

4. **Use at least 12 appropriate sources, at least ¾ of which should be peer-reviewed, primary research presented in professional journals (15 pts.).**

**Avoid any chance or appearance of plagiarism!** Make sure you credit the correct source for any ideas or facts that are not your own. Avoid direct quotes; place ideas in your own words within the context of your paper and then use proper citation formats. **The consequences of plagiarism are very serious. I don't even have the option of dealing with it on my own; I must turn you and the suspect materials in to the University Committee on Academic Misconduct.** It is your responsibility to give me no reason to suspect your work.

**A draft of your term paper will be due three weeks (plus one spring break) before the finished product.** The purpose of the draft is mainly to be certain you are correctly applying the prescribed style to appropriately academic content. As such, **the draft’s length and state of completion are relatively open ended:** whatever and however much you submit, I will strive to read and provide critical commentary in response. **In general, try to include a mostly complete title page, at least one header, at least one page of finished narrative, and some citations.**

**Peer review**
Each student will follow the general guidance provided by the North American Journal of Fisheries Management to submit a formal peer-review on one other student’s paper. Author names will be redacted for anonymity. In reviewing the work of your peers, be certain to refer to the prescribed style and author guides.

Copies of term papers and peer reviews will be returned to students who would like them on finals day.
Suggestions for term-paper/annotated-bibliography topics

- Power-generating plants and their effects on fisheries.
- Great Lakes (or any Great Lake) commercial or recreational fisheries.
- The history of Common Carp in North America and its impacts on aquatic ecosystems.
- The effects of new invasive species on native fisheries.
- Alewife ecology and the associated management implications on the Great Lakes.
- Sea Lamprey ecology and associated management implications.
- Striped Bass ecology and associated management implications.
- Cage-culture of finfishes.
- Fishing rights of Native Americans.
- Aquaculture in developing countries.
- Mortality associated with fishing tournaments and management implications.
- Sample-gear bias and implications for planning monitoring/research programs.
- Managing quarry/upground reservoir fisheries.
- Current problems and new ideas in fisheries management.
- Lake eutrophication and potential effects on fisheries.
- Fisheries management, planning, and policy.
- Fisheries economics: recreational or commercial fishing and effects on regional economies.
- Paddlefish ecology and associated management implications.
- Salmonid ecology and associated management implications.
- The effects of in-stream impoundments or dam removal on fisheries.
- Fish use of water-control structures and/or artificial habitat.
- Trophic cascade effects of fish on benthic invertebrate or plankton populations.
- Fish movements: the implications of migration for managed fisheries.
- The effects of fish on wetlands.
- The effects of wetland loss on fisheries.
- The effects of stocking on wild trout populations in streams.
- The use of length limits or other harvest restrictions in fisheries management or to structure populations.
- Genetic, species, or functional biodiversity effects on food webs.
- Largemouth or Smallmouth bass ecology and associated management implications.
- Asian carps and the Great Lakes: potential ecological impacts.
- The use of fishes or aquatic invertebrates as indicators of aquatic ecosystem biotic integrity.
- Environmental contaminants: bioaccumulation/biomagnification to fish tissue or fish-consumption advisories.
- Managing urban fisheries.
- Comparisons of effectiveness among different regulations, regulation types, or management jurisdictions.
**Academic integrity**

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (CoAM) expect that all students have read and understand the University’s Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University’s Code of Student Conduct and this syllabus may constitute “Academic Misconduct.”

The Ohio State University’s Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: “Any activity that tends to compromise the academic integrity of the University, or subvert the educational process.” Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University’s Code of Student Conduct is never considered an “excuse” for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the CoAM. If the committee determines that you have violated the University’s Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic integrity and misconduct to which you can refer include:

- The Committee on Academic Misconduct web pages: [oaa.osu.edu/coam.html](http://oaa.osu.edu/coam.html)
- Ten Suggestions for Preserving Academic Integrity: [oaa.osu.edu/coamtensuggestions.html](http://oaa.osu.edu/coamtensuggestions.html)

**Disability statement**

Any student who feels they may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please contact the Office for Disability Services at 614-292-3307 in room 098 Baker Hall to coordinate reasonable accommodations for students with documented disabilities.