Freshwater Fisheries Management
ENR 4342: Spring 2020
1:50–2:45; M, W, and F; Kottman Hall, rm. 370

Instructional Staff
Eugene Braig: Extension Program Director
Office: 379A Kottman Hall
Phone: 614-292-3823
e-mail: braig.1@osu.edu
Office hours: by appointment

Jeffry T. Hayes: Teaching Assistant
Office: 109 Heffner Building
e-mail: hayes.846@osu.edu
Office hours: by appointment

Course description
This course is an introduction to the conceptual elements of inland fisheries management as practiced in North America. It will provide fisheries and wildlife students with background information for future courses and the profession. It is also organized to provide useful information to students who may not have the opportunity to take other 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.

C. Students will understand the development, use, and revision of policy/regulation to attain management objectives.

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 demonstrate basic understanding of the application of population functions in fisheries management and conservation decisions.

1. Students will recognize and define 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.
**Course goals**
D. Students will increase their ability to professionally communicate knowledge about this topic matter.

**Learning objectives**
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><strong>Homework</strong></td>
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<tr>
<td>Fish &amp; wildlife conference</td>
<td>50</td>
</tr>
<tr>
<td>Population estimation</td>
<td>50</td>
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<tr>
<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><strong>Writing project</strong></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>
</tr>
<tr>
<td>Peer review</td>
<td>75</td>
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<tr>
<td><strong>Exams</strong></td>
<td></td>
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<tr>
<td>Midterm 1</td>
<td>100</td>
</tr>
<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><strong>Total:</strong></td>
<td><strong>1,000</strong></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 CarmenCanvas or in hard copy (term papers must be submitted electronically). All late assignments will be docked 10% per day. I don’t feel this to be exorbitant, so exceptions to this policy are almost never granted. Please plan accordingly.

Examinations will be divided between multiple choice, 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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<tr>
<th>Grade</th>
<th>Percentage Range</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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<tr>
<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>
<td>73.00–76.99 %</td>
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<tr>
<td>C-</td>
<td>70.00–72.99 %</td>
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<td>D+</td>
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<td>60.00–66.99 %</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 overview*

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

**Week 2–4**

*Introduction to ichthyology and fish ecology*

H&Q Ch. 2

**Week 4–5**

*Fishery assessments*

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

**Week 6**

*Watersheds and lotic habitat management*

Describing lotic habitats H&Q Ch. 10
Habitat management, degradation, and restoration

**Week 6–7**

*Lentic habitat management*

Describing lentic habitats H&Q Ch. 13
Management of natural and artificial lakes as habitat

**Week 7–9**

*Management of introduced fishes*

Reasons for fish introductions H&Q Ch. 8 & 9
Stocking programs
Evaluations of fish introductions
Aquatic invasive species

**Week 9–10**

*Managing with regulations*

Objectives H&Q Ch. 7 & 12
Types
Regulatory process
Fish assemblages and aquatic communities as regulatory tools
Management of aquatic endangered species
Week 11–12  Conservation and management practices of flowing-water fisheries
Coldwater streams  H&Q Ch. 18, 19, 20, & 21
Warmwater streams
Big rivers
Managing anadromous fishes

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

Week 13–14  Conservation and management of natural-lake fisheries
Basis of fish production  H&Q Ch. 15, 16, & 17
Approaches to lake management
Great Lakes fisheries 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: 6–10 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: 10–14 February</td>
<td><strong>Midterm 1.</strong></td>
<td>Lecture: Watershed and stream habitat management.</td>
<td>Lecture: Reservoir and lake habitat management. <strong>Annotated bibliography due.</strong></td>
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<td>Break: 9–20 March</td>
<td><strong>Spring break (although it’s technically still winter): no classes.</strong></td>
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<tr>
<td>11: 30 March–3 April</td>
<td><strong>Midterm 2.</strong></td>
<td>Discussion and exercise: Fisheries assessment.</td>
<td>Lecture: Cold- and warmwater stream fisheries.</td>
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<tr>
<td>14: 20–24 April</td>
<td>Lecture: Great Lakes fisheries.</td>
<td>Elective lecture: paddlefish ranching video(s) and discussion</td>
<td>Review session.</td>
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<td>Finals week</td>
<td><strong>Final exam: Friday, 1 May 2020, 4:00–5:45 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 service/site that 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).

Use A Guide to AFS Publications Style (2016) and the Fisheries Magazine Author Instructions
to guide your formatting and technical style. Author instructions can be accessed via link posted to https://fisheries.org/books-journals/fisheries-2/fisheries-guides-for-authors/, and hard copies will be distributed in class. I will also post both documents 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.

For the reference-list entry, carefully note formatting details: the sequence of major elements, that only the primary author is listed with family name first; the inclusion of spaces between initials; sentence-style capitalization of the article’s title (including proper-noun treatment of species-level common names); title-style capitalization of the journal; and the use of punctuation, including periods, the serial comma, and the colon and short or en dash (not the hyphen) in volume and page-range info. Note the citation format, format for naming a fish species, use of active voice, general tone, and concision within the annotation.

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 tables, figures, 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. You will submit your paper via CarmenCanvas. Microsoft Word must be able to open submissions.

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 instructions. Many of the formatting expectations (including for section headings, line spacing, line and page numbering, etc.) can be found in the author instructions spanning subheadings under “FORMATTING.” Please ask if any aspect is not clear to you. I assumed the instructions compiled in past syllabus incarnations, 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): The title page must stand alone and only include the information specified in the author instructions. Be certain to include a title that is crafted to be explicitly descriptive of the finished paper’s content. Include your affiliation and professional address with your name (for this purpose, you’re welcome to use that of your major’s department). Be certain to **number pages and each line of text throughout the paper**, title page included (this facilitates review). **Also, be certain that your name does not appear in any document headers or footers that follow the title page.** This is in effort to keep the peer review process that we require at the end of the semester anonymous.

2. **Abstract** (required): The abstract must be presented on its own stand-alone page. Format as a single paragraph of 150 or fewer words that concisely describes the content of the entire paper. The abstract should be understandable and stand on its own; thus, do not use statements that directly reference the paper to follow (e.g., “This paper will present [such and such]” etc. would not be appropriate in an abstract). To be certain that your abstract is truly representative, you’re usually best served to write your abstract last.

3. **Body of narrative** (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 following the abstract, 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 paper is likely to take the form of “review articles,” “policy and issue papers,” possibly “essays,” or perhaps even “fisheries education.” This is not necessarily representative of a typical submission to any journal with a focus on primary research; thus, some common components of scientific papers (perhaps especially “methods” and “results”) aren’t necessarily appropriate here (although they can be if it seems appropriate to you). Feel free to consider examples of other review papers in crafting your content and section headings. I will post several recently published review articles to Carmen as examples 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 must include at least 12 sources** (ideally, even more), at least ⅜ of which (ideally, even more) will 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): Tables are numeric or textual information organized into columns and rows. **Tables must consist of actual text and/or numerical information created in word-processing or spreadsheet software; tables must not be “un-editable pictures that have been pasted into the document.”** Every table should receive a parenthetical citation in your narrative: e.g., “… (Table 1).” **The tables themselves should be compiled together following your references and any acknowledgements.** Number each table sequentially in spite of however numbered in its source (the first table you reference 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 provide enough information that readers can easily perceive the table’s purpose and structure. The first sentence does not have to be complete. Subsequent sentences, which do have to be complete, should present additional 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. **Figure captions and figures** (optional): Figures are graphic information or images. Every figure should receive a parenthetical citation in your narrative: e.g., “… (Figure 1).” Figure captions should be compiled together as a separate, stand-alone list following your narrative and any tables. Each caption should begin with its figure’s 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). **The figures themselves should be compiled together following their list of captions.** (In an actual manuscript submission, figures would be submitted as independent files. For this exercise, I don’t mind if figures are pasted into your document so long as they’re all compiled at the end.) Number each figure sequentially in spite of however numbered in its source (the first figure you reference will be “Figure 1”; the second, “Figure 2”; etc. even if your source labeled it with some different number).

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 outlined below.

The **Fisheries Magazine Author Instructions** describe a cover letter for manuscript submissions. Your term paper for this course **will not need to include a cover letter**.

The following guidelines will comprise a general 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 test results (30 pts.).** This means that **you must support your assertions with numbers**—if possible, wherever appropriate, including reference to hypothesis tests and associated numeric statistics—and correct citations for the sources of those numbers. Please ask for assistance if you don’t know what’s typically reported with any particular statistical test.
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 will be peer-reviewed, primary research presented in professional journals (15 pts.).**

A draft of your term paper will be due two weeks (plus one spring break) before the finished product. The purpose of the draft is mainly to be certain that 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 section heading, at least one page of finished narrative, and some citations and references. Including an outline in addition to draft narrative can be useful, but is not required.

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’s Committee on Academic Misconduct. It is your responsibility to give me no reason to suspect your work.

Peer review
Each student will follow the general guidance provided by Fisheries 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. I will provide several recent peer reviews submitted to misc. aquatic-science journals as examples.
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 effects 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-/Net-pen-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.
- The relationship among population rate functions within a stock of management interest.
- Managing quarry/upground reservoir fisheries.
- Current problems and/or new ideas in fisheries management.
- Lake eutrophication and potential effects on fisheries.
- 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 and water quality.
- 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: oaa.osu.edu/academic-integrity-and-misconduct
- Information for students: oaa.osu.edu/academic-integrity-and-misconduct/student-misconduct

Disability statement

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Ave., Columbus, OH 43210.