

BES 301: Science Methods and Practice

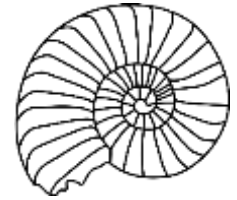
Interdisciplinary Arts and Sciences

University of Washington Bothell, Au 2017

Section A: Wednesdays 1:15 – 3:15

Section B: Thursdays 1:15 – 3:15. *This is a hybrid course.*

Meet in UW1-120



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Office hours: M 10 – 11am online, using conference in Canvas. Th noon – 1p, f2f in UW 2-220 or online.

Additional appointments and online office hours are available.

The University of Washington treats this syllabus as formal agreements between the instructor and students. While changes during the quarter are possible due to unforeseen circumstances, I will adhere to the syllabus as closely as possible.

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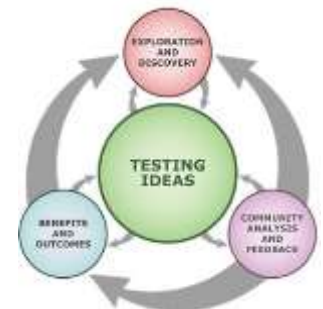
Proposed Outline

About this course

Course Description

This class is a general introduction to the practice of science, intended as an overview of the scientific process. You'll learn by doing, working with real datasets to research the questions that you generate. Since I am a paleobiologist, we will use a database about fossils as our jumping-off point for immersing ourselves in the scientific process.

This course is required for science students in IAS, and is also open to others who are interested in scientific inquiry. You'll learn approaches to communicating science, analyzing and presenting data, and reviewing literature.



[How Science Works](#). © University of California Museum of Paleontology.



Course Learning Objectives

You can expect to learn approaches to data analysis, data presentation, literature searching and science writing that will be applicable to advanced science courses at UWB and to doing science in general. The broad learning objectives of the course are to:

- learn to do scientific research and assume a scientific identity. You will ask questions, form hypotheses, collect the right observations and data, plan your research project, analyze and interpret your data, and present your findings.
- use statistics to analyze quantitative data, and present the results of your analyses in graphs and in words.
- find, read, and understand primary literature about your research topic.
- adopt a collaborative approach to doing science, including conducting peer review by working with your classmates to exchange ideas, share resources, and review each other's work.
- write a scientific paper that present the results of your original, scientific research and that places your work in the context of primary literature from that discipline.

Is This Course Appropriate for Me?

Your background

This course is designed to provide an overview of how science works, with a particular emphasis on aspects of the scientific process that will serve science students in advanced courses. To benefit from this course:

- You should have prior exposure to science courses, and thus a basic familiarity with scientific information, its presentation, and the process of scientific investigations.
- You should be comfortable with algebra, probability, and presentation of quantitative information in graphical and tabular forms (and be able to interpret data presented in such forms).
- A prior course in statistics would be helpful, but is not required.
- If you do not have this background you are strongly advised to discuss this with me before taking this course.

Access to technology

Half of this course is online and therefore requires a reliable fast-speed Internet connection. The [Open Learning Lab](#) and the [library](#) can provide access on-campus if you need it. You also need to make sure that you know how to access the course using Canvas. If you are not familiar with Canvas, please visit the UWB Learning Technologies [student tutorial page](#) (or just Google: UWB Canvas students). We'll be using Microsoft Excel to complete the statistical analyses for your research projects.

The nature of a hybrid course

Hybrid courses combine face-to-face meetings with extensive learning opportunities orchestrated through the course website. This course is 50% hybrid, meaning that class meets in person only once a week, and that you have more homework to complete. Our face-to-face meetings are required and essential to your success in this course. Active participation in both the face-to-face and online activities is required to pass this course.

Hybrid courses require more time doing assignments than courses that are completely face-to-face. To succeed, you should:

- organize your time well.
- schedule times to work on class material, making good use of the [Open Learning Lab](#), the [Quantitative Skills Center](#), and the [Writing and Communication Center](#). You may find it helpful to find a group of people with whom to work



weekly—either in person at one of these centers, or working together remotely through a platform like Google Hangouts.

- be prepared to read and write a lot, especially in an online setting.
- be comfortable with using the Internet, email, and various software applications.
- have easy access to computers and fast-speed Internet.
- be willing to discuss and interact with others online.
- be self-motivated enough to finish assignments on deadline with little to no supervision.

Attendance at all face-to-face sessions is expected



You are responsible for any material presented or announced in class sessions. If you miss a class, you are advised to obtain notes from a classmate with regard to the material presented and any important course announcements. Basic course notes are available on the web site. If you have questions about material you may have missed you can see me during office hours or schedule an appointment.

Context for this course in IAS

IAS Program Core Learning Objectives

The [School of Interdisciplinary Arts and Sciences](#) focuses all students' experiences around [five core learning objectives](#):

- Collaboration and shared leadership
- Critical thinking
- Diversity and equity
- Interdisciplinary research and inquiry
- Writing and presentation

These objectives apply across all areas of study and your experiences in every IAS course should allow you to develop your abilities and understanding in most, if not all, of the four objectives. This material and assignments in this course will help you in these topics.

IAS Student Portfolio

If you are an IAS student, you began (or are currently beginning) the development of a student degree portfolio in the program core course (BIS 300). You will use this portfolio as a way to reflect on your learning in relation to the IAS core learning objectives, particularly in the required portfolio capstone course (BIS 499). The assignments in this course make great evidence of such learning. You should be sure to pick up and save these assignments (the assignment handout and your submission with instructor comments) for use in your final portfolio in your senior seminar course.

Course Policies

Classroom Conduct

Please be on time, focused, and willing to be curious. During lectures, I encourage you to ask questions and participate in discussion, rather than passively absorbing information. During collaborative time, as you work in groups on analyzing and interpreting data, the aim is a quiet but conversational working environment.

Netiquette

As you know, it's easy to miscommunicate online. In this class, we'll adopt the following netiquette policies (adapted from Madison College) to minimize miscommunication and foster a respectful and supportive online environment.



- *Diversity.* Respect each other's background, feelings and opinions.
- *Talk gently.* It's easy to be abrupt, and unintentionally hurt someone's feelings when writing. So, talk without strong language. Try not to be sarcastic or funny, as these are easy to misinterpret. If you're writing something that is emotionally charged, start by writing a draft, let it sit for a while, and re-read a few hours later to make sure the tone is appropriate. Send it only after you are sure it is courteous.
- *Allow for mistakes.* Despite best intentions, sometimes you might be hurt by something that someone in the course says. Please talk to the instructor about this, as she can help resolve the conflicts. Remember that usually—but certainly not always—the writer does not intend to be hurtful.
- *Respect privacy.* Please don't share people's work or email messages. What happens in this class, stays in this class.
- *Write well.* Be clear and concise, use good spelling and grammar. Stay on topic. To check clarity, read your message aloud to yourself before sending it.
- *Read thoroughly before you write.* Read other people's comments before making your own.
- *Responding to a previous message.* Post comments under that message in the string to keep related topics organized. Specify the person and the particular point you are commenting on.
- *Conventions.* Avoid caps, exclamation points, acronyms (wrt, btw, b/c, etc) and emoticons.

Late work

Late assignments will only be considered up to three days past the deadline, unless exceptional circumstances are at play. As the instructor, I will decide what is exceptional, and I will let you know if I need documentation of any sort. For each day late, you will receive a deduction of 10% of the initial possible points. You can request an extension on an assignment if you ask a week in advance of its due date. *Because your colleagues are counting on you to turn in your paper drafts in order to complete their peer review assignment, I will not accept late or incomplete work for your Results or Discussion.*

Computers and cell phones

We will be using computers regularly in this course. Please refrain from (1) activities without a direct connection to what is happening in class and (2) disturbing other students. **This means that you should not check email, Facebook, Twitter, Instagram, etc. You may not use your phone in this class.**

University Policies

Respect for diversity

Diverse backgrounds and experiences are essential to the critical thinking at the heart of university education. In IAS and at UW Bothell, students are expected to respect individual differences, which may include, but are not limited to: age, cultural background, disability, ethnicity, family status, gender presentation, immigration status, national origin, race, religion, sex, sexual orientation, socioeconomic status, and veteran status. We will engage respectfully in discussion of diverse worldviews and ideologies embedded in course readings, presentations, and artifacts, including those course materials that are at odds with personal beliefs and values.



Students seeking support around these issues can find more information and resources at <http://www.uwb.edu/diversity>.

Access and accommodations

Your experience in this class is important to me, and it is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law. I am committed to providing



access to my classes for all students; please speak to me if you need an academic accommodation. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course. If you experience barriers based on disability, and you are uncomfortable speaking to me directly, please seek a meeting with Disability Resources for Students (DRS) to discuss and address them.

If you have not established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (including but not limited to mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 425-352-5307 or uwbdrs@uw.edu. DRS offers resources and coordinates reasonable accommodations for students. Reasonable accommodations are established through an interactive process between you, your instructor(s), and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

For Veterans

If you are a student who has served in our nation’s military forces, welcome home and thank you for your service. I hope that you feel comfortable enough to confidentially self-identify yourself to me so I can help you make a successful transition from the military to higher education.

Academic honesty

Practice academic integrity. In particular, don’t plagiarize. *Plagiarism will result in a grade of zero for the assignment in question, and may even result in a grade of zero for the entire course.* The UWB General Catalog, the documents you signed upon admission to IAS, and the [policy statements](#) contain crucial information regarding campus policies about academic integrity. You are responsible for knowing what constitutes a violation of the University of Washington Student Code, and you will be held responsible for any such violations even if they were not intentional. The campus has compiled an extremely useful [website](#) with resources for avoiding plagiarism.

Inclement weather



Please check if the campus may be closed due to weather. Information on suspension of operations will be made public and available through the media, and are also available on the website or by calling the Campus Information Hotline 425.352.3333. You may also sign up with an alert system that will contact you via email or text message if classes are canceled. For more information, see <http://www.uwb.edu/alert>. Class activities will be rescheduled as needed.

Student support services

Library	425-352-5340
Writing and Communication Center	425-352-5253
Quantitative Skills Center	425-352-3170
Student Success and Career Services	425-352-3776
Student Counseling Services	425-352-3183
Disability Resources for Students	425-352-5307



You receive W (writing) credit for completing this course. A W course requires that you write and revise 10-15 pages. Your final paper is that long, and you will receive feedback from your peers and instructor to help you improve your writing—you’ll learn a lot both by conducting your own reviews and by reading other people’s comments. I also encourage you to make use of the free resources at the [Writing and Communication Center \(WaCC\)](#). Check out the



course calendar on Canvas, and [schedule visits or online-meetings](#) with peer consultants before drafts of different sections of your paper are due. The WaCC can also help you understand the primary literature you are reading. You can call them at 425-352-5253, or just drop in to see them in UW2-124.

There is also a significant quantitative component of this course; we will be working with numbers. Everyone will complete their own work, but help each other! I also encourage you to make use of the campus resources available to you in the Quantitative Skills Center. It is a free, drop-in center with tutors trained to help students understand the concepts behind the numbers and build confidence in solving quantitative problems. You can find times when tutors are available for the concepts we will use in this course in the [online schedule](#). Alternately you can call them at 425-352-3170, or just drop in to see them in UW2-030.

Communication

You are automatically enrolled in a Canvas page for this course. Canvas is an educational software platform that will host our course web site, including announcements, readings, assignments, and other course elements. Please access Canvas right away. One way to access Canvas is to visit your MyUW page and click on Canvas LMS, under “Quick Links” on the right side of the page.

I will use Canvas to send email messages to your UW email address. Please email me through Canvas as well. You can set your UW email account to automatically forward messages to another email address.

Grading

Assignment	Points
Short assignments (at home and in-class)	40
Data analysis exam	10
Peer Reviews	15
Final Project	35
Total	100

Your final grade for this course will be determined by the number of points you accumulate throughout the quarter, converted to a percentage of total points. To convert this percentage to a 4.0 scale, subtract 55, and then divide by 10. Example: If your overall course grade is 85, the GPA grade is $(85-55)/10 = 3.0$. If I feel this score does not reflect the high quality of your work, I may increase your score by up to 0.3 points above the one that is calculated. The maximum possible score is 4.0.

Assignments

Homework assignments are due on Tuesdays and Saturdays at 1:15 pm.

Short assignments

Assignments may be either in-class exercises or homework. In-class activities require that you participate in class, in either small groups or whole-class discussions (please see me if this sounds uncomfortable to you). I understand unpredictable conflicts occur during the quarter; to accommodate this conflicts, I will drop your two lowest grades in this category.



I grade in-class assignments how thoughtfully and completely you do your in-class work, your contributions to small group discussion, and your contributions to whole-class discussion.

- 10 Your participation is high in all aspects of the class. You frequently contribute to discussions orally &/or in collaborative documents. Your comments are insightful and relevant. You listen attentively to others.
- 8-9 Your participation is good. You contribute to discussions orally &/or in collaborative documents. Your comments are usually relevant, and you usually listen to others.
- 7 Your participation is basic. You contribute to discussion orally &.or in collaborative documents. Your comments are sometimes insightful, but often not relevant to class material. You are sometimes inattentive to others.
- 6 Your participation is substandard.
- 0 You are not participating.

I will use a rubric to grade your homework assignments; the rubrics are always available on the Canvas.

Data analysis exam

Yay! You get to apply stats to answer your research question—which will make you a pro at answering the kinds of questions I’ll ask you on this exam.



Peer Review



Science is a collaborative enterprise, and your participation in class is crucial to both your own learning and your classmates’, especially your research group as your paper develops. Peer review is an essential component of research, and it’s one of the main reasons journal articles have such credibility. You’ll help each other improve your analysis, interpretation and writing skills by reviewing each other’s papers. Full credit on the assignment reflects careful consideration, constructive comments and valuable advice.

In order to obtain a useful peer review, you need to turn in an adequately prepared paper. *If your paper is not finished on time or if the work is too sloppy to assess, then you will receive a 0 for the peer review assignment, I will deduct 10% from your final paper grade, and you will need to make an appointment with the Writing and Communication Center to gain feedback about that section of the paper within one week of the due date.*

Final project



Your final paper assignment will be a revision of all the pieces that you write throughout the quarter. The paper will represent a novel piece of research—asking and addressing a question that no one has addressed before!

If reviewers for a scientific journal like the research that a paper addresses, but still have questions about it, then the editor for that journal will often ask the authors to revise and resubmit their paper.

The paper is resubmitted with a cover letter that demonstrates to the editor that they’ve carefully considered the reviewers’ comments by detailing the changes that they made to the manuscript and that also justifies why some changes were not made. You’ll write a cover letter to the editor (me) in that style, commenting on the feedback you received from your peers.

Deductions

Certain habits are common and, while not wrong, they detract from the learning experiences that I aim to create in this class. To discourage their use, I deduct points if you use them.



Direct quotes



For every direct quotation that you use, I will deduct 5% of your grade for that assignment. That is because I want you to practice paraphrasing scholarly writing, using indirect quotes. Remember to cite your sources in text when you use *indirect* quotes. Failure to do so is a form of plagiarism.

Inadequate preparation

The final paper is a cumulative project that you will write throughout the quarter. You'll be conducting peer reviews. In order to make the most of your peer review, you need to do your best job at meeting the criteria for writing a good Results section and a good Discussion. All too often, we are tempted to turn in less-than-stellar work for a draft. If this were to happen in the real world, the editor would immediately reject your paper, deeming it not worth scientists' time to review. To emulate that in the classroom, if any of your drafts are not adequately prepared by the due date, then *(1) you will not participate in the peer review for that assignment, receiving a 0 for that grade, (2) I will deduct 10% from your final paper grade, and (3) you will need to make an appointment with the Writing and Communication Center to gain feedback about that section of the paper within one week of the due date.*

Proposed Outline

You are responsible for all materials, updates, and announcements covered during class sessions. This outline may change due to unforeseen circumstances. Homework assignments are always due at 1:15pm. HW means homework, and f2f means face-to-face.

Week	HW 1, Tu	Topic	f2f, W or Th	Topic	HW 2, Sa	Topic
1			9/27, 9/28	Intro	9/30	Set Up
2	10/3	Establishing a baseline Intro to Paleobiology (the study of fossils)	10/4, 10/5	Your project: studies from the PBDB	10/7	More about your project Begin Stats worksheet (visit the QSC to complete this)
3	10/10	Continue stats	10/11, 10/12	Hypotheses, stats	10/14	Continue stats
4	10/17	Your data Small group meetings	10/18, 10/19	Data Workshop	10/21	Continue with your data Update your hypothesis
5	10/24	Library worksheet Continue with your data	10/25, 10/26	Library workshop Library exit ticket	10/28	Test of hypothesis due
6	10/31	3 articles and why they help	11/1, 11/2	Results	11/4	Results Prepare for exam
7	11/7	Results due Study for exam	11/8, 11/9	Data Analysis Exam	11/11	 Veteran's day. Nothing due.
8	11/14	Peer review of Results due	11/15, 11/16	Methods, Intros, Discussions	11/18	Theories and Hypotheses
9	11/21	Discussion	11/22, 11/23	No class. Remote office hours Wed 11/22	11/24	 Thanksgiving break. Nothing due.
10	11/28	Discussion due Credibility	11/29, 11/30	Credibility	12/2	Peer Review of Discussion due
11	12/5	End of quarter check-in Work on paper	12/7, 12/8	You are the future of science	12/9	Cover letters
12			Dec 14 for everyone	No meeting. Final paper & cover letter due Thursday 1:15pm for everyone.		

