

Mathematical Logic

MATH 161 – Fall 2018

👤 Dr. Joshua Wiscons (he/him/his)
📍 Brighton (BRH) 144
🗨️ MW 11:30AM–12:30PM; Th 12:30PM–1:15PM;
And also **by appointment**
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Welcome! You've been exposed to logical reasoning before, but now we'll take a closer look, studying things like the language(s) of mathematics, how formal mathematical statements are given meaning, what actually constitutes a proof of a statement, and the interplay between these ideas. For example, is there always a way to *prove* a true statement (no matter how hard to find)? The course promises to be fun, counterintuitive (at times), and, well, a bit technical. But definitely fun!

"The more I think about language, the more it amazes me that people ever understand each other at all." - Kurt Gödel

📖 **Catalog Description.** Advanced study of logic with special application to mathematics.

✅ **Prerequisites.** Math 108 (Introduction to Formal Mathematics).

📖 **Book.** We will use *A Friendly Introduction to Mathematical Logic*, 2nd Edition, by Christopher C. Leary and Lars Kristiansen. **Please make sure you get the second edition.** You can choose from a free electronic version of the book or a very modestly priced print copy; the details are here:

minerva.geneseo.edu/a-friendly-introduction-to-mathematical-logic/

⚙️ **Course Goals.** The overarching goals of this course are to (1) increase the students' capacity for critical thinking and fact-based reasoning, (2) develop the necessary competency with the concepts and mechanics mathematical logic for further study in mathematics and applications to other fields, and (3) improve the students' written and oral communication of mathematics, and (4) develop the skills and mindset for solving problems in a team.

✍️ **Focus on Writing** Mathematics is deeply concerned with solving old problems, stating new ones, generalizing and abstracting existing theories, and uncovering new connections, but the end product is always a precise, concise, and thorough article. An "advance" in mathematics is nothing until others believe and understand it. One major goal of this course is to improve the students' ability to write logically precise, well-structured, and well-justified mathematics. Supplementing this goal, the course aims to build proficiently in typesetting mathematics with \LaTeX .

📅 **Typical Day.** A typical class meeting will consist of small-group discussion, student presentations, and mini-lectures.

🗣️ **Class Etiquette.** Diversity and individual difference are appreciated and recognized as a source of strength. All students are encouraged and expected to *speak up* and participate during class and to *step back* and include others in the conversation. Every member of this class must show respect for every other member. Attitudes or actions destructive to the sense of community that we strive to create are not welcome and will not be tolerated.

Get Connected

Visit Me [Brighton 144]

Visit the Math Lab [Brighton 118]

Explorer Our Community!
Don't know where to start?
Check out our Multi-Cultural Center

Some Resources

Me! Stop by or email me anytime!

Could benefit from accommodations?
Talk with me or visit the SSWD office [Lassen 1008]

Experiencing challenges with food and/or stable housing?
Visit our Basic Needs website: www.csus.edu/basicneeds/

COURSE DETAILS

Course Components

Homework. Homework will *usually* be due each class meeting. You are *allowed and encouraged* to work together, but you are expected to **write up your solutions on your own**. All assignments should be **clearly, and clearly written**, including proper grammar. The entire assignment will be graded on a ✓-system.

✓ ⁺	You have a clearly-written, well-thought-out approach for <i>every</i> problem.
✓	You have a clearly-written, well-thought-out approach for <i>most</i> problems.
✓ ⁻	I see that you have worked on this, but little progress was made.
—	It doesn't seem to me that you worked on this assignment enough.

Discussion and Participation. Learning to discuss mathematics is a highly valued part of this course. This component will evaluate your progress in areas such as ability to describe a solution (with clarity and thoughtfulness), ability to share and shed light on your difficulties, and ability to listen critically and respond accordingly. You will be assessed on how you engage with your group each day, how active you are in class-wide discussions, and how prepared you are to present at the board. Please let me know if you need to miss class because repeated absences will impact this portion of your grade. For presentations, I will use the following rubric:

✓ ⁺	Well thought out approach, clearly and thoughtfully articulated.
✓	Well-thought-out approach, but the explanation lacked some clarity (or thoughtfulness).
✓ ⁻	Approach was not well thought out, but ideas were well communicated.
—	It seems to me that you were unprepared.

Writing Assignments. These will *usually* be due every **Sunday** by 5PM and must be typed up with \LaTeX . Becoming proficient with \LaTeX is one of the aims of the course—I will support you as much as needed with this. Each problem will be graded on a 0–4 scale.

4	This is a clearly-written, correct, and well-justified solution.
3	This is a good piece of work, yet there are some mathematical or writing errors that need addressing.
2	There is some good intuition here, but there is at least one serious flaw.
1	I see that you have worked on this, but there are multiple serious flaws; come see me!
0	It doesn't seem to me that you worked on this problem enough.

Final Project. Later in the course, you will be responsible for researching a logic topic of your own choosing (but I am happy to provide options!). You do not need to prove something original, but you will be required to write up an introduction to your topic, including motivation, definitions, statements of theorems, and proofs (in your own words!) of some of the results. This will likely be 3–5 pages. You will also give an approximately 20 minute in-class presentation on your topic. We will use our final exam time for some of the presentations; it is scheduled for Thursday, December 13 from 12:45PM–2:45PM.

Grade Composition

Homework	20%
Discussion and Participation	20%
Writing Assignments	20%
Final Paper	20%
Final Presentation	20%

In general, letter-grade cutoffs will be standard: A 100–90%, B 89–80%, C 79–70%, D 69–60%, F 59–0%.

Accommodations. Any student needing academic adjustments or accommodations should speak with me privately as soon as possible. If you have one, please bring a copy of your accommodation letter from the [Services to Students with Disabilities \(SSWD\) office](http://www.csus.edu/sswd/) (www.csus.edu/sswd/). All discussions will remain confidential.

Cheating Cheating will result in disciplinary action and will be reported to the [Office of Student Conduct](#). If you are unsure what constitutes cheating, please speak with me and review Sacramento State's *Academic Honesty Policy and Procedures* document here: www.csus.edu/umannual/student/stu-0100.htm.

(SOME) CAMPUS RESOURCES

Basic Needs Support. If you are experiencing challenges in the area of food and/or stable housing, help is just a click, email or phone call away! Sacramento State offers basic needs support for students who are experiencing challenges in these areas. Learn more about your options and resources here: www.csus.edu/basicneeds/

Centers for Diversity and Inclusion. We have a family of Centers,

- Women's Resource Center,
- Multi-Cultural Center, and
- PRIDE Center,

that provide students with validation and support, while also engaging the larger Hornet community in coordinated efforts to interrogate and explore identity, promote cultural pluralism, and contribute to social justice. Check them out here: www.csus.edu/cdi/

College Assistance Migrant Program (CAMP). CAMP is designed to help students from migrant and seasonal farm worker backgrounds succeed at Sacramento State. CAMP facilitates transition from high school to college and offers first-year support services to develop the skills necessary to persist and graduate from college. CAMP strives to be "a home away from home" for its students. More here: www.csus.edu/camp/

Counseling Services. Confidential counseling services are available on campus for Sacramento State students. Counselors are located on the second floor of the WELL. Appointments can be made 8:00AM–5:00PM, Monday–Friday. Call 916-278-6461 to make an appointment. **If you are in immediate crisis, please call 9-1-1 or the Suicide Hotline at 1-800-273-TALK (8255).**

Dreamer Resource Center (DRC). The DRC's mission is to make the dream of a college degree a reality for undocumented students and students with mixed-status families at Sacramento State by helping students overcome the unique challenges that get in the way of achieving academic, personal and professional excellence. Learn more here: www.csus.edu/saseep/drc/

Full Circle Project (FCP). The FCP aims to provide a student-centered approach to steadily increase the graduation rates of underrepresented Asian American and Pacific Islander (AAPI) and other high-need students through rigorous coursework, academic support, intentional student organization and leadership opportunities, career planning and meaningful community engagement. Lot's more info here: www.csus.edu/fcp/

MLK Scholars. The MLK Scholar's program is designed to support and ensure the success of African American students or those with an interest in African American heritage in their quest toward a degree at Sacramento State. Learn more here: www.csus.edu/saseep/mlk/

Peer & Academic Resource Center (PARC). PARC provides **free** peer tutoring, advising, and supplemental instruction. For more information or to make an appointment, go here: www.csus.edu/parc/

Serna Center. The Serna Center's mission is to promote, foster, and enhance self-advocacy, empowerment and leadership among Chicanxs/Latinxs students and students from other under-represented backgrounds at Sacramento State. Learn more here: www.csus.edu/sernacenter/

Services to Students with Disabilities (SSWD). SSWD offers a wide range of support services and accommodations for students in order to ensure students with disabilities have equal access and opportunity to pursue their educational goals. More info here: www.csus.edu/sswd/

Sexual Misconduct. We have a confidential support advocate on campus to assist students who have experienced sexual assault, intimate partner violence, sexual harassment, and stalking. To set up an appointment with the advocate, call 916-278-5850 or schedule an appointment online through your patient portal.

If you are in immediate danger or need immediate assistance, please call 9-1-1 or if you are on campus, campus police at 916-278-6000. If it is after hours or the weekend and you need immediate advocacy, please call WEAVE's 24-hour hotline at 916-920-2952.