

Course Proof and Problem Solving
Name:

Course Code: MATH 103-01

Term: Fall 2026

Credit Hour: 3

Modality: In person

Schedule: MWF 2:10 pm to 3pm

Location: LKH 200



Instructor Information:

Name: Sankar Sitaraman

Email: ssitaraman@howard.edu

Office ASB-B 219

Location:

Office MWF 3pm to 4pm

Course page: nature-lover.net/math and Canvas

Course Syllabus

Course Description:

This course is designed to help mathematics majors make the transition from lower-level science and engineering oriented mathematics courses to the more advanced and abstract upper-level courses.

Provide for majors an early exposure to mathematics from the viewpoint of mathematicians.

Course Objectives: Upon successfully completing the course, learners will be able to:

Know the following:

The basic principles of problem solving.

The translation of verbal discussions into analytical arguments.

The introduction of concepts and proof techniques that are the basis of many required math courses (such as Introduction to Analysis 195/795).

Among the problem-solving and proof techniques considered are the following: induction, contradiction, proof by cases, and counting methods.

Prerequisite(s): Calculus 1 (Math 156)

Required Course Materials:

Stephen Lay, Analysis with an Introduction to Proof, Prentice Hall, 4th ed, 2005

Grading and Evaluation: Your grade in the course will be determined as follows:

Classwork	150
Oral exams	50
Best 2 of 3 tests	200
Final	100
Total	500

Using external aids in exam is strictly prohibited. The Instructor may require an oral presentation in his office from any student whose exam indicates use of external resources. The exam grade will not be finalized until the oral presentation is completed.

Your final grade in the course will be a letter grade. Letter grade equivalents for numerical grades are as follows: **(after converting from 500 to 100)**

% Grade	Scale
90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
< 59	F

Attendance and Participation Policy:

All students are expected to attend classes regularly and promptly. Students are expected to participate in class discussions and group projects. Students should not leave the class while it is in progress unless it is extremely urgent or an emergency. Students that are absent for health reasons are expected to present documentation as soon as possible. If you are absent from classes or laboratory periods, you are still responsible for the work missed. If you miss a scheduled midterm or final exam, you must obtain your instructor's approval to take a substitute exam or you will receive a grade of zero for the exam.

Course Schedule / Outline (TENTATIVE ; SUBJECT TO CHANGE)**For up to date information see update page on my website**

Week:	Dates:	Lesson Objectives:	Section Title in Textbook
1	January 12-16	Introductions, course schedule, Intro to Proofs, Examples, Basics of Logic	Logical connectives
2	January 21-23	Logical Statements, DeMorgan's rule Converse and contrapositive	Logical Connectives; Quantifiers
3	January 26-30	Proof by counterexample and contradiction	Techniques of Proof I and II
4	February 2-6	More examples of proofs Intro to set theory	Techniques of Proof I and II Basic Set Operations
5	Feb 9-13 TEST 1	Review Feb 9 TEST 1 Feb 11 More on sets Feb 13	Review all material before test Basic Set Ops
6	February 16-20	Relations and Functions Equivalence relations	Relations Functions
7	February 25-27	Bijections between sets Cardinality of Infinite sets	Functions Cardinality
8	March 2-6	More on equivalence relations More examples on cardinality Proof by cases and contradiction	Functions Cardinality Techniques of Proof II

9	March 16-20 TEST 2	Review Mar 16 TEST 2 Mar 18 Proof by induction Mar 20	Before test: review all after test 1 After test: Natural Numbers and Induction
10	March 23-27	Proof by induction Proof by strong induction	natural numbers and induction Notes on update page
11	March 30 April 1	Sequences and Limits Proofs using definition of limits (epsilon delta definition)	Convergence
12	April 6-10	Monotone Sequences and limit theorems	Monotone sequences
13	April 13-17	Proofs involving continuity, Intermediate value theorem Convergence of series	Notes on limits on update page
14	April 20-24 TEST 3	Review Apr 20 TEST 3 APR 22 Apr 24: Wrap up	Notes on limits on update page
15	April 27	Wrap up	
Final Exam		Tuesday May 5 2-4pm same room	

GRIEVANCE PROCEDURE: If you have any problems with class please contact me at my email.

If we cannot resolve the issue please contact undergraduate director Dr. Sam Hopkins in math dept.

If that doesn't help either please contact chairman Dr. Bourama Toni (bourama.toni AT howard, NOT bison.howard).

University Services

Academic and Student Support Services

For Tutoring Services, visit the [Tutoring & Learning Support Services Office](#).

For Writing assistance, visit the [Writing Center](#).

For Library Services, visit the [Howard University Libraries](#).

For Academic Advising, visit the [Academic Advising Services](#).

For general student academic support, visit the [Center for Academic Excellence](#).

For general student support, visit the [Division of Student Affairs](#).

Technology Support

Enterprise Technology Services:

- For questions about the LMS or third-party tools, visit [My Helpdesk](#) and select LMS Support
- For general tech support questions visit [My Helpdesk](#) and select Technical Support.
- To contact ETS: **Phone & Email**
Phone: 202-806-2020
Email: huhelpdesk@howard.edu

LMS Support:

- Canvas has 24/7 support via chat or call 1-877-686-8251. To access Canvas Chat, please click on the Help icon in the bottom left-hand corner of your Canvas Dashboard.
- To contact ETS: **Phone & Email**
Phone: 202-806-2020
Email: huhelpdesk@howard.edu

Proctorio Support:

- ETS Proctorio support, [visit here](#) for Frequently Asked Questions (FAQs)
- To contact Proctorio: 24/7 technical support to students
Phone at (480) 428-4089 or toll-free (866) 948-9248.
Email support@proctorio.com

University Statements and Compliance

The Americans with Disabilities Act (ADA)

Howard University is committed to creating an accessible, inclusive, and safe learning environment for all students and providing equal access to students with documented disabilities. Students seeking reasonable accommodations must first register with the Office of Student Services (OSS). There you can engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom and clinical settings, which the Office of Student Services (OSS) determines. Accommodations must be requested each semester. Accommodations are not provided retroactively. If you want to request accommodations, please contact OSS via email at oss.disabilityservices@howard.edu or visit <https://howard.edu/disability-services>.

COVID-19 Statement

The indoor mask mandate has been lifted on campus for all faculty, staff, students, and visitors, with a notable exception like patient settings. Faculty may continue to require masks for individual classes. In those classes where a face mask is required, students will be directed to leave the classroom if a face mask is not worn properly to cover the nose and mouth. Any student who refuses or fails to comply with a specific classroom requirement to wear a face mask, and any other measures the University advances for the safety and protection of the Howard Community, will constitute a violation of the University's Student Code of Conduct and could result in sanctions up to and including expulsion from the University.

LGBTQ+

Howard University is committed to providing an educational, living, and working environment that is welcoming, respectful, and inclusive of all members of the University community, including all sexes, sexual orientations, gender expressions, and gender identities. For more information please contact the [Division of Student Affairs](#).

Educational Benefits and Opportunities

No member of the University Community shall deny a student fair access to all educational opportunities and benefits available at the University. To find more information on this policy, please refer to the [Code of Ethical Conduct](#). To report a concern, visit the [Office of Student Affairs](#).

The Family Educational Rights and Privacy Act (FERPA)

It is the policy of Howard University (the "University") to ensure that information contained

To find more information about this policy visit the [FERPA Policy](#) page.

Title IX Statement

Howard University's [Policy Prohibiting Sex and Gender-Based Discrimination, Sexual Misconduct and Retaliation](#) (aka, the Title IX Policy) prohibits discrimination, harassment, and violence based on sex, gender, gender expression, gender identity, sexual orientation, pregnancy, or marital status. With the exception of certain employees designated as confidential, note that all Howard University employees – *including all faculty members* – are required to report any information they receive regarding known or suspected prohibited conduct under the Title IX Policy to the Title IX Office (TitleIX@howard.edu or 202-806-2550), regardless of how they learn of it. For *confidential* support and assistance, you may contact the Interpersonal Violence Prevention Program (202-836-1401) or the University Counseling Service (202-806-7540). To learn more about your rights, resources, and options for reporting and/or seeking confidential support services (including additional confidential resources, both on and off campus), visit <https://howard.edu/title-ix>.

Academic Code of Conduct

Howard University is a community of scholars composed of faculty and students both of whom must hold the pursuit of learning and search for truth in the highest regard. Such regard requires adherence to the goal of unquestionable integrity and honesty in the discharge of teaching and learning responsibilities. The prescribed policies and procedures that pertain to violation of the academic integrity policy are contained in the [Student Handbook](#). Please note include the appropriate student handbook from your perspective college or school (e.g. Howard university school of law student handbook, etc.)

Expected Computer and Digital Information Literacy Skills

The following computer skills and digital information literacy skills expected for this course include:

- Using the learning management system (Canvas)
- Using email
- Uploading and downloading documents, files, etc.
- Using web conferencing tools and software
- Using remote/virtual libraries and databases
- Properly citing information sources

For assistance with these skills please visit [Distance Learning for Students Orientation](#).

Communication Policy

Course Components	What you may expect from the facilitators:	What is expected of you:
Email	An instructor will respond to your e-mails within 24 to 48 hours. We often check our email and typically respond promptly. However, please allow an entire business day before emailing again on the same question or issue. Emails sent on Saturday or Sunday will receive a reply by Monday or Tuesday. Please do not expect to receive returned email from your instructor on Saturdays or Sundays.	If you have a personal question, please send an email. Questions regarding the course content should be posted in the discussion forum titled – Café. Please sign all your emails with your full name.
Phone	You are welcome to call your instructors, although our preferred communication is through email. If it is a matter of solving a technology question, please email the helpdesk at helpdesk@howard.edu . Please be aware that your instructors are not available to return or receive your calls on Saturdays or Sundays.	If you do not receive a response follow up. Be sure to check your emails to ensure you are responsive should the helpdesk have questions. Include your full name, name of the course, name of the instructor and a clear description of your issue. Provide a good contact number should they need to call you back.
Announcements	We will post new announcements to alert you of any new happenings in our course, on Canvas and Update Page	Read the announcements for any new updates and the important notices from the facilitators.
Virtual Office Hours	We will be available to make an appointment with you should you require additional assistance outside of our established lab sessions. Please be aware that it will be imperative to email us to set up an appointment time and we will be available virtually.	Contact the facilitators of this course to set up additional time to meet as well be prepared to utilize the Canvas Collaborate or the designated web conferencing medium selected feature in order to access us virtually during your appointed time.