Evaluating Infinite Series

Splash 2022

Instructor:	Allen Lin	**Time:**	November 19, 13:00 – 14:00
Email:	allenees@mit.edu	**Location:**	To be announced.

MIT Police Line: (617) 253–1212

Course Page: https://esp.mit.edu/learn/Splash/2022/Classes/M15209/index.html#

Objective: Provides an introduction to infinite series and methods to determine convergence or divergence. States values of well-known results from power, geometric, and Taylor series, with special examples from the Riemann zeta function $\zeta(s)$ and Dirichlet series $L(s, \chi)$.

Prerequisites: Understanding of calculus is beneficial but **not assumed**. Come with a passion to learn!

Office Hours: Because Splash 2022 is from November 19–20, I will not be holding office hours. However, all are welcome to email me with questions; I am more than happy to discuss with you.

Tentative Course Outline:

- An introduction.
- Geometric series.
- Convergence. Who cares about divergence?
- Taylor series and the calculus.
- Primes and the abstract. Riemann zeta function $\zeta(s)$.
- Dirichlet series and L-functions $L(s, \chi)$.
- A bit of my research.

Main References: This is a compilation of books that I highly encourage you give a read if you find these topics interesting. I drew inspiration from these texts, and I hope you do, too. Note that these books are more rigorous than class and require mathematical maturity.

- Tom M. Apostol, *Introduction to Analytical Number Theory*, Springer, 1976.
- Walter Rudin, *Principles of Mathematical Analysis*, McGraw-Hill, 1976.
- Lars V. Ahlfors, *Complex Analysis: An Introduction to the Theory of Analytic Functions of One Complex Variable*, McGraw-Hill, 1966.
- Ivan Niven, Herbert S. Zuckerman, Hugh L. Montgomery, *An Introduction to the Theory of Numbers*, John Wiley & Sons, Inc., 1960.
- Paul Lockhart, *A Mathematician's Lament*, Bellevue Literary Press, 2009.
- G. H. Hardy, *A Mathematician's Apology*, Cambridge University Press, 1940.

Class Policy: By registering for this class for Splash 2022, you are expected to attend class.