

On-line course materials

MATH41022 - Analytic Number Theory

Year: 4 - Semester: 2 - Credit Rating: 15

Requisites

Prerequisites

MATH20101 or MATH20142

Aims

To show how the tools of Mathematical analysis can be used to prove results about prime numbers and functions defined on the integers.

Brief Description

We start by giving two proofs of the infinitude of primes. The methods are elementary but poor in that they do not tell us the truth of how many primes there are. Stronger tools are introduced, improving the results until we can give a proof of the Prime Number Theorem.

Learning Outcomes

On completion of this unit students

- will be able to utilise the correspondence between the product of Dirichlet series and composition of arithmetic functions,
- will be able to use the methods of Partial Summation and replacing sums by integrals,
- be able to prove elementary results on sums over primes,
- be able to prove some analytic properties of the Riemann zeta function,
- appreciate a proof of the Prime Number Theorem,
- will be able to use the Composition Method to estimate sums of arithmetic functions.

Syllabus

- Two proofs of the infinitude of primes. [3]
- Arithmetic functions and Dirichlet Series. [5]
- Elementary Prime Number Theory. [6]
- The Prime Number Theorem. [8]

- Sums of arithmetic functions. [6]

Teaching & Learning Process (Hours Allocated To)

Lectures	Tutorials/ Example Classes	Practical Work/ Laboratory	Private Study	Total
33	11	0	106	150

Assessment and Feedback

End of semester examination: three hours weighting 100% (MATH41002)

Further Reading

- T. Apostol, Introduction to Analytic Number Theory, 1st edition. 1976, Corrected 5th edition 2010, Springer, 1441928057
- G.J.O. Jameson, The Prime Number Theorem, LMS Student Texts 53, CUP 2003, 0-521-89110-8.

Staff Involved

Dr Mark Coleman - Lecturer

Data source is EPS system

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