Analytic Number Theory

Instructor and Class Information

Lecturer:	Roman Holowinsky	**Course Num.:**	
Office:	MW 634	**Lecture Room:**	
Phone:	292-3941	**Lecture Times:**	
Email:	holowinsky.1@osu.edu	**Office Hours:**	

About Course Goals

FORMAT

The course will meet three times a week for 55 minutes each meeting. Instructions will be mainly by lecture delivered by the instructor. It may also include occasional in-class discussion as well as short student presentations, particularly, by post-candidacy students.

DESCRIPTION & GOALS

This course provides students with a solid working knowledge in the fundamentals of Analytic Number Theory. Topics include Arithmetic Functions, Dirichlet characters, Gauss and character sums, Summation Formulae, L-functions and associated properties, primes in arithmetic progression, holomorphic modular forms, sums of Kloosterman sums, elementary sieve methods and Large Sieve Inequalities. The course should be of interest to all students with research interests in Number Theory.

PREREQUISITES

Math 7121 and 6222. [see official course description]

Textbook

MAIN REFERENCE

Iwaniec, Henryk; Kowalski, Emmanuel: *"Analytic Number Theory"*. American Mathematical Society Colloquium Publications, 53 *Providence, RI,* 2004. xii+615 pp. ISBN: 0-8218-3633-1.

ADDITIONAL REFERENCES

Davenport, Harold: *"Multiplicative Number Theory"*. Third edition. Revised and with a preface by Hugh L. Montgomery. Graduate Texts in Mathematics, 74. *Springer-Verlag, New York,* 2000. xiv+177 pp. ISBN: 0-387-95097-4.

Montgomery, Hugh L.; Vaughan, Robert C.: *"Multiplicative Number Theory. I. Classical Theory"*. Cambridge Studies in Advanced Mathematics, 97. *Cambridge University Press, Cambridge,* 2007. xviii+552 pp. ISBN: 978-0-521-84903-6.

Murty, M. Ram: *"Problems in Analytic Number Theory"*. Second edition. Graduate Texts in Mathematics, 206. Readings in Mathematics. *Springer, New York,* 2008. xxii+502 pp. ISBN: 978-0-387-72349-5.

Assessments

HOMEWORK ASSIGNMENTS

There will be approximately 5 homework assignment sheets, which will typically contain several fully described problems as well as a list of numbers of textbook problems. Due dates of assignments will announced and set typically a week after the assignments are published

FINAL PROJECT

The final project is a more extensive written assignment that will draw on techniques acquired throughout the semester. It will be published about two weeks before the end of classes and will be due at the beginning of finals week.

CLASS PARTICIPATION AND ATTENDANCE

Although attendance is not regularly monitored, frequent absences are likely to be noted and may factor into the grade in borderline cases.

Grading

COURSE SCORE

A course score will be computed from the above assessments. Homework assignments will count 70% towards the grade and the final project 30%.

LETTER GRADES

Letter grades will be determined based on the course score. The approximate minimum scores letter grades are 80% for an "A", 73% for an "A-", 67% for a "B+", 55% for a "B-", and 40% for a "C-". The exact cut-off scores may vary depending on the difficulty of assignments.

Weekly Schedule

Week 1	Intro to the course, Arithmetic Functions and Dirichlet series
Week 2	Summation Formulas: Euler-Maclaurin, Poisson summation, etc
Week 3	Analytic Continuation, Functional Equation and zeros of Riemann zeta
Week 4	Non-vanishing and Prime Number Theorem
Week 5	Dirichlet Characters and Gauss sums
Week 6	Dirichlet L-functions, Functional Equation and zeros
Week 7	Primes in Arithmetic Progression
Week 8	Classical Analytic Theory of L-functions
Week 9	Elementary Sieve Methods
Week 10	Elementary Sieve Methods (continued)
Week 11	Bilinear Forms and the Large Sieve
Week 12	Holomorphic Modular Forms
Week 13	Sums of Kloosterman Sums
Week 14	Current Trends and Open Problems

General Policies

ACADEMIC MISCONDUCT

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/info_for_students/csc.asp)."

DISABILITY SERVICES

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.