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## Seminar in Number Theory

### COURSE SYLLABUS

**INSTRUCTOR:** Krishnaswami Alladi

**DATES & TIME:** MWF 6-th period (12:50 – 1:40 pm)

**ROOM:** LIT 221

**OFFICE:** LIT 304

**OFFICE HOURS:** M and W 7th period and by appointment

**COURSE DESCRIPTION:** The theory of partitions was founded by Euler. Although partitions are combinatorial objects, Euler used formal power series to establish his identities. These series considered by Euler are special cases of  $q$ -hypergeometric series, whose systematic study was taken up much later. In the latter part of the 19th century, Sylvester and his school, extended many results of Euler by purely combinatorial methods. Then in the early part of the 20th century, the Indian mathematical genius Srinivasa Ramanujan, with his magic touch, gloriously transformed the subject. He discovered spectacular results involving continued fractions, hypergeometric series, theta functions, partition congruences, and modular forms that revealed surprising connections between apparently disparate fields. Today the theory of partitions and  $q$ -hypergeometric series ( $q$ -series for short) is at the cross-roads of number theory, combinatorics, analysis, and the theory of modular forms. We shall begin with the foundations laid by Euler, and then establish several combinatorial results of the Sylvester school. Then we will take up a discussion of  $q$ -series before delving into the fascinating realm of Ramanujan. We shall study recent partition results and conclude the course with the remarkable Hardy-Ramanujan asymptotic series for the partition function by using the circle method, a powerful analytic technique that they initiated.

The course will be self contained and should appeal to any graduate student or advanced undergraduate.

**TEXT:** I will use my own notes but will give references to books and monographs.

**GRADING:** Grades will be based on homework assigned.

**DIVERSITY STATEMENT:** I am committed to diversity and inclusion of all students in this course. I acknowledge, respect, and value the diverse nature, background and perspective of students and believe that it furthers academic achievements. It is my intent to present materials and activities that are respectful of diversity: race, color, creed, gender, gender identity, sexual orientation, age, religious status, national origin, ethnicity, disability, socioeconomic status, and any other distinguishing qualities.

**ADDITIONAL INFORMATION:**

**Honor Code:** “UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor in this class.”

**Class Attendance:** “Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.”

**Accommodations for Students with Disabilities:** “Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.”

**Online Evaluations:** “Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.”

**Contact information for the Counseling and Wellness Center:**

<https://counseling.ufl.edu/>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

**U Matter, We Care:** If you or someone you know is in distress, please contact

umatter@ufl.edu, 352-392-1575, or visit <https://umatter.ufl.edu/> to refer or report a concern and a team member will reach out to the student in distress.



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