

# Syllabus of MA6252: Topics in random matrix theory

- Lecturer: Dr Wang Dong
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  - Prerequisite: Linear algebra, complex analysis and probability
  - Course description: this module is an introduction to the random matrix theory. Both the global and local properties of typical random matrices are covered. Various methods used for different random matrix models are discussed. The goal is to present fundamental results and techniques in the study of random matrices. The preliminary requirements will be kept minimum.
  - Course contents:
    - Wigner semicircle law
    - GUE, GOE and GSE
    - Airy kernel, universality
    - Tracy-Widom distribution
    - Other topics depending on the time permitted
  - References:
    - Greg W. Anderson, Alice Guionnet, and Ofer Zeitouni. *An introduction to random matrices*, volume 118 of *Cambridge Studies in Advanced Mathematics*. Cambridge University Press, Cambridge, 2010.
    - Zhidong Bai and Jack W. Silverstein. *Spectral analysis of large dimensional random matrices*. Springer Series in Statistics. Springer, New York, second edition, 2010.
    - P. J. Forrester. *Log-gases and random matrices*, volume 34 of *London Mathematical Society Monographs Series*. Princeton University Press, Princeton, NJ, 2010.
    - Madan Lal Mehta. *Random matrices*, volume 142 of *Pure and Applied Mathematics (Amsterdam)*. Elsevier/Academic Press, Amsterdam, third edition, 2004.
    - *Topics in random matrix theory*, volume 132 of *Graduate Studies in Mathematics*. American Mathematical Society, Providence, RI, 2012.
- The book by Anderson, Guionnet and Zeitouni has an online version <http://www.math.umn.edu/~zeitouni/technion/cupbook.pdf>, and the book by Tao has an online version <http://terrytao.files.wordpress.com/2011/02/matrix-book.pdf>
- Assessment: Assessment of students will be based on
    - Homework, 40%
    - Presentation, 40%,
    - Participation, 20%.

*To get the credit for a homework problem, you do not need to submit a complete and flawless solution, but you need to show the effort that you put in. Please submit your solutions even if they are incomplete or simply wrong. I want to know your work and thought on the problems.*