## Perspectives in Mathematical Science IV/II Part I (Yanagida) Introduction to Macdonald-Koornwinder polynomials \*1

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#### Course purpose

This course is designed for **4th grade undergraduates** and for **Master Course students**. All the contents including blackboard writings and handouts will be presented in English. This course is partitioned into three parts.

The schedule is as follows. The dates of Part II and Part III may be changed.

Part I	10/02,  10/09,  10/16,  10/23	Yanagida
Part II	10/30,  11/06,  11/13,  11/20	Bachmann
Part III	12/11 or $12/18$ , $12/18$ or $12/25$ , $01/15$ , $01/22$	Furusho

#### Grading of this course

The grading will be determined by the sum of the points given in three parts. Each lecturer will give 0–4 points. For undergraduates, the grading is S: 10–12 points, A: 8–9, B: 6–7, C: 4–5, F: 0–3. For graduates, A: 8–12, B: 6–7, C: 4–5, F: 0–3.

## Contents of Part I

I will give 4 lectures on 10/02, 10/09, 10/16 and 10/23. In these lectures I will explain

- classical theory of symmetric polynomials, in particular Schur polynomials
- Macdonald symmetric polynomials (= Macdonald polynomials of type  $A_n$ )
- Macdonald polynomials for general root systems
- Koornwinder polynomials (= Macdonald polynomials of type  $BC_n$ )

## Grading of Part I

Several problems will be assigned in the lectures. Submit your report to me directly, or to the report box. The deadline of reports in Part I is **October 29th (Monday)**.

#### Office hours, etc.

My office hours are on **12:00–13:00**, **Thursday** held at **Cafe David**. You can also contact me directly by e-mail.

<sup>\*1 2018/09/29,</sup> ver. 0.5.

# Webpage

All the materials will be put on the webpage at http://www.math.nagoya-u.ac.jp/~yanagida/2018WP.html

# Schedule and References of Part I

• Schedule

Date	Contents	References
10/02	Schur polynomials	[M95, Chap. I], [N97, §1], [O06, 第9章]
10/09	Macdonald symmetric polynomials	[M95, Chap. VI], [N97, §1]
10/16	Macdonald polynomials for general root systems	[M98], [M03]
10/23	Koornwinder polynomials	[K92], [N97]

## • References

T. Koornwinder, Askey-Wilson Polynomials for Root Systems of Type BC,	
Contemporary Mathematics 138 (1992).	
I. G. Macdonald, Symmetric functions and orthogonal polynomials,	
University Lecture Series, 12, American Mathematical Society, 1998.	
I. G. Macdonald, Affine Hecke algebras and orthogonal polynomials,	
Cambridge tracts in mathematics, 157, Cambridge University Press, 2003.	
三町勝久, マクドナルド多項式入門, 代数学百科 I 群論の進化 第4章, 朝倉書店, 2004.	
野海正俊述, 長谷川浩司記, 「アフィン Hecke 環と多変数直交多項式」	
東北大学集中講義講義録, 1997;	
available at https://www.math.nagoya-u.ac.jp/~yanagida/others-j.html	
岡田聡一, 古典群の表現論と組み合わせ論 下, 培風館, 2006.	