

# Topics in Mathematics: Matroid Theory

수학특강 : Matroid 이론

*Please see the following document for a quick introduction to matroids:  
J. Oxley, **What is a matroid?**, <http://www.math.lsu.edu/~oxley/survey4.pdf>*

This course will introduce the notion of matroids, a common generalization of vector spaces and graphs. We will start with learning several equivalent definitions of matroids and then study various aspects of matroids, including duality and minors, matroid intersection and union theorems, representable matroids and graphic matroids.

It is recommended to have some prior knowledge on elementary linear algebra as well as graph theory.

Lecture	MW 10:30AM-11:45AM	Classroom: E6-1 (자연과학동), Room 2413
Instructor	Sang-il Oum (엄상일)	<a href="http://mathsci.kaist.ac.kr/~sangil/">http://mathsci.kaist.ac.kr/~sangil/</a>
	Email: <a href="mailto:sangil@kaist.edu">sangil@kaist.edu</a>	Office: E6-1 Room 3403.
Office Hours	Monday 4PM or by appointments.	We will discuss homework solutions during the office hour following the due date. Therefore it is recommended to attend office hours.
Course website	<a href="http://klms.kaist.ac.kr/">http://klms.kaist.ac.kr/</a> .	
Textbook	There is no main textbook.  For references, please see the following:	G. Gordon, J. McNulty, <i>Matroids: A Geometric Introduction</i> . Cambridge.  J. Oxley, <i>Matroid Theory</i> , Oxford University Press.  D. Král' and O. Pangrác, <i>Introduction to Matroid Theory (Lecture notes)</i> , ITI Series 2009-430, Charles University, Prague, Czech Republic. (Will be provided in class.)
Grading	20% Homework, 30% Midterms, 50% Final.	The lowest score and the second lowest score from assignments will be dropped. You will earn <i>A</i> if (but not only if) your score is at least 90, <i>B</i> if your score is at least 80, <i>C</i> if your score is at least 70.
Midterm Exams	T.B.A.	
Final Exam	T.B.A.	We will have an oral exam for the final, unless there are too many students.
Homework		Homework will be given biweekly in class on Thursday. The assignment is due at the beginning of the Thursday class. You may collaborate with other students. But <b>homework should be written by yourself independently and you must understand your solution.</b>
Plan	<b>Week 1-2</b> A tour of matroids. <b>Week 3-4</b> Cryptomorphisms. <b>Week 5-6</b> New matroids from old (Deletion and Contraction, Duality, Connectivity) <b>Week 7</b> Matroid Intersection and Unions. <b>Week 8</b> Midterm Exam <b>Week 9</b> Graphic Matroids. <b>Week 10</b> Finite Geometry. <b>Week 11</b> Representable Matroids. <b>Week 12</b> Other Matroids. <b>Week 13-14</b> Matroid Minors. The Splitter Theorem.	

**Week 15** Tutte Polynomial

**Week 16** Final Exam

This plan is subject to change.

- Hint for the course: Attend the class, Understand notions through examples, Ask questions, Do the homework.