授業科目名	多面体計算学；理論，実際と理学工学への応用						
英語名	Polyhedral Computation: Theory, Practice and Applications in Engineering and Science						
担当教員名	David Avis						
配当学年		単位数	2	開講期	後期	曜時限	
授業種別・授業形態	専攻専門科目 講義			授業言語	英語		

【授業の概要・目的】

英語版参照

【授業計画と内容】

英語版参照

【履修要件】

英語版参照

【成績評価の方法・基準】

英語版参照

【教科書】

英語版参照

【参考書等】

英語版参照

【その他（授業外学習の指示・オフィスアワー等）】

英語版参照

Course Title	Polyhedral Computation: Theory, Practice and Applications in Engineering and Science						
Instructor(s)	David Avis						
Assigned Grade		Units	2	Semester	Fall	Time	
Course Category & Course Type	Specialized subject Lecture			Language	English		

Course Description (overview, purpose)

Convex polyhedra form a fundamental modeling tool in many areas of engineering, science and applied mathematics. Applications arise in such diverse fields as molecular biology, materials science, game theory, embedded systems, robotics and even quantum computation.

In dealing with polyhedral models, various challenging computational problems arise.

Among these problems are vertex enumeration, redundancy removal, volume computation, polyhedral intersection, computation of a Voronoi diagram, etc.

The first part of this course will involve a study of the best available algorithms for solving these problems. For this part of the course, linear algebra and a basic knowledge of linear programming will be assumed. Students will obtain hands-on experience with state-of-the-art software for these problems.

The second part of the course will consist of a study of various applications of polyhedral computation in engineering and science. The topics will be chosen according to the background and interests of students. Students with limited background in linear programming are advised first to take "Computational Intractability: NP-completeness and Integer Programming, with Scheduling Applications."

Course Schedule

The following topics are covered, each in one to three lectures.

1. Examples of polyhedral computation problems arising in various fields.
2. Basic problems in polyhedral computation.
3. Polyhedral problems solvable by linear programming.
4. The vertex enumeration problem and its relatives.
5. Algorithms for vertex enumeration.
6. Applications to game theory, triangulations, Voronoi diagrams, etc.
7. Connections with integer programming.

Prerequisites and Course Requirements

A basic knowledge of linear programming is assumed.
Grading Methods and Evaluation Criteria
Students are required to submit reports on subjects that will be given during lectures. The final report will be on an application chosen by each student, that is solved using techniques and software taught in the course.

Textbooks
N/A
References
N/A
Miscellaneous (homework assignment, office hours etc.)
Course materials can be downloaded from the course web page that will be announced during the first lecture