Computational Geometry

Semester :	Winter 2015/2016 [Other terms: · Winter 14/15 · Winter 13/14 · Winter 12/13]
Module # :	INF-ALG-18 , INF-ALG-18
Event # :	INF-ALG-007, INF-ALG-008
Programmes :	Diplom Informatik, Master Informatik, Diplom Wirtschaftsinformatik, Master Wirtschaftsinformatik
IBR Group(s) :	ALG (Prof. Fekete)
Type :	Vorlesung/Übung

Lecturer :

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Assistant :	Melanie Papenberg
Credits :	5
Hours :	2+1+1
Time & Place :	Lecture: Tuesday, 09:45 - 11:15 hrs., IZ 305
	Tutorial: Thursday, 15:00 - 16:30 hrs., IZ 305, bi-weekly
	Small Tutorial: Thursday, 15:00 - 16:30 hrs., IZ 305, bi-weekly. Tutor: Melanie Papenberg
Start :	First Lecture: Tuesday, 03.11.2015
	First Tutorial: Thursday, 19.11.2015
	First Small Tutorial: Thursday, 26.11.2015
Prerequisites :	Basic knowledge of analysis of Algorithms and Data Structures is required. Basic knowledge of probability is useful but not required.
Language :	English
Certificates :	Homework assignments during the semester (=Studienleistung) and one exam at the end.
Content :	This course is meant to be a first course in Computational Geometry. After this course, the participants will have acquired good knowledge about core topics in Computational Geometry that by now have gathered a significant amount of research and practical applications. The participants will be able to handle common design paradigms of geometric algorithms such as divide-and-conquer, sweep-line, as well as probabilistic. They will also be able to design and analyze geometric algorithms taking into consideration inherent intricacies of geometric computations. Topics on this course include among other:

1. Geometric Primitives
2. Convex Hulls
3. Polygon Triangulation
4. Voronoi Diagrams
5. Delaunay Triangulation
6. Point Location and Proximity
7. Degeneracies and Robustness
8. Arrangements and Duality

References :	The course will not follow any book in particular but below there is a list of relevant literature.

- Franco P. Preparata, Michael Shamos: Computational Geometry: An Introduction, Springer-Verlag New York.

- Joseph O'Rourke: Computational Geometry in C, Second Edition, Cambridge University Press.

- Mark de Berg, Marc van Kreveld, Mark Overmars and Otfried Schwarzkopf: *Computational Geometry: Algorithms and Applications*, Second. Edition, pages 367, Springer-Verlag, 2000 (deBerg2000, BibTeX)

- Jean-Daniel Boissonnat, Mariette Yvinec: Algorithmic Geometry, Cambridge University Press.
- Joseph O'Rourke: Computational Geometry in C, Second Edition, Cambridge University Press.

General Information

- Schedule of all lectures, tutorials, and home assignments: PDF [20.10.2015]
- There is a mailinglist. We will distribute the homework sets and other announcements via this list, so, please subscribe!

Homework Sets

1. Set 1: [PDF] Out: 09.11.2015. Due: 23.11.2015.
2. Set 2: [PDF] Out: 23.11.2015. Due: 07.12.2015.
3. Set 3: [PDF] Out: 07.12.2015. Due: 04.01.2016.
4. Set 4: [PDF] Out: 04.01.2016. Due: 18.01.2016.
5. Set 5: [PDF] Out: 22.01.2016. Due: 05.02.2016.