Lecture No	Date	Content	Reference	Additional Reading
1	2/2/21	Administrative announcements. Motivations for looking beyond worst case: 2-Opt algorithm for TSP.	Class slides.	
2	3/2/21	2 - Opt algorithm for TSP. Variants of TSP: Euclidean TSP and Metric TSP. k-means clustering. Average case analysis. Limitations.	Class slides.	
3	4/2/21	Limitations of average case analysis. Need for smoothed analysis.	Lecture notes by Bodo Manthey (in the ref. Materials folder).	
4	5/2/21	Models for Smoothed analysis.	Lecture notes by Heiko Roeglin and Bodo Manthey (in the ref. Materials folder) .	
5	16/2/21	Smoothed analysis of 2-Opt: A toy example demonstrating the issues and tools required.	Paper by Englert - Roeglin-Voecking (available in the google drive) Pages 20-21.	
6	17/2/21	Basics of probability: distributions, expectations and variance, tail bounds.	Notes by Heiko Roeglin.	
7	18/2/21	Basics of probability (contd).	Notes by Heiko Roeglin. Some examples borrowed from Sheldon Ross's *A first course in Probability Theory*	
8	19/2/21	Smoothed analysis of 2-Opt	Notes by Bodo Manthey	
9	23/2/21	Smoothed analysis of 2-Opt (Contd). Knapsack - Pareto Optimality	Notes by Bodo Manthey For knapsack - Notes by Heiko Roeglin	Read about Chi-distribution. Conditional probability. (Say from Sheldon Ross' book or any other book on probability). Take some examples of knapsack and see Pareto optimal solutions and how many of them are optimal

				solutions..
10	24/2/21	Knapsack - Pareto Optimality and Nemhauser-Ullmann algorithm	Notes by Heiko Roeglin	
11	25/2/21	Nemhauser-Ullmann algorithm. Smoothed number of pareto optimal solutions.	Notes by Heiko Roeglin	
12	26/2/21	Smoothed number of pareto optimal solutions (contd).	Notes by Heiko Roeglin	
13	2/3/21	Smoothed number of pareto optimal solutions (contd). Lower bound. (Without proof). Discussion on project topics.	Notes by Heiko Roeglin	
14	3/3/21	Core algorithms for knapsack. Basics of complexity: NP vs P.	Notes by Heiko Roeglin	
15	4/3/21	Definition of ZPP. Binary multi-objective optimization problems.	Notes by Heiko Roeglin	
16	5/3/21	Binary multi-objective optimization problems (contd).	Notes by Heiko Roeglin	
17	9/3/21	Binary multi-objective optimization problems (contd).	Notes by Heiko Roeglin	
18	10/3/21	Binary multi-objective optimization problems (contd).	Notes by Heiko Roeglin	
19	11/3/21	Binary multi-objective optimization problems (contd).	Notes by Heiko Roeglin	
	12/3/21	No class	Notes by Heiko Roeglin	
20	16/3/21	Successive Shortest path algorithm (intro)	Notes by Heiko Roeglin	
21	17/3/21	Successive Shortest path algorithm	Notes by Heiko Roeglin	
22	18/3/21	Successive Shortest path algorithm	Notes by Heiko Roeglin	
23	19/3/21	Successive Shortest path algorithm.	Notes by Heiko Roeglin	
25	23/3/21	Smoothed Analysis: Challenges	Your class notes. Book by	

		ahead and open questions. Probabilistic Analysis introduction	Yukich. Survey by Karp and Steele	
26	24/3/21	Probabilistic Analysis of ETSP: SUbadditivity and superadditivity.	Yukich.	
27	25/3/21	Probabilistic Analysis of ETSP: Superadditivity and canonical boundary functional. Growth bound.	Yukich.	
28	07/4/21	Probabilistic Analysis of ETSP: Smoothness condition. Closeness to the canonical boundary functional		
29	8/4/21	Closeness in mean.		
30	9/4/21	Probabilistic Analysis of ETSP: Limit theorem.	Book by Yukich. Survey by Karp and Steele	
31	15/4/21	Limit theorem.	Book by Yukich. Survey by Karp and Steele	
32	16/4/21	Limit theorem. Partitioning algorithm.	Book by Yukich. Survey by Karp and Steele	
33	20/4/21	Overview and future directions. Introduction to isoperimetry	Book by Yukich. Survey by Karp and Steele	
34	21/4/21	Isoperimetry.	Dubhashi and Panconesi	
35	22/4/21	Isoperimetry (contd) Algorithms on Random graphs - introduction.	Dubhashi and Panconesi	
36	23/4/21	Algorithms on Random graphs: Hamiltonian cycles.	Survey by Frieze and Reed	
37	27/4/21	Algorithms on Random graphs: Graph isomorphism.	Survey by Frieze and Reed	
38	28/4/21	Algorithms on Random graphs: matching	Survey by Frieze and Reed	
39	29/4/21	Algorithms on Random graphs: Greedy algorithms	Survey by Frieze and Reed	
40	30/4/21	Algorithms on Random graphs: Greedy algorithms	Survey by Frieze and Reed	
	4/5/21	Concluding remarks.	Survey by Frieze and Reed	

	6 - 8	End Semester exam.		