COLUMBIA | ENGINEERING
The Fu Foundation School of Engineering and Applied Science

Autonomous Multi-Agent Systems (Spring 2020)[1]

Reading list

This document contains a list of papers, organized by topic, that we will study in class. We will not cover all the papers listed, likewise additional papers may be added by request. There is also a list of references that cover the background material in depth – if this is the first time you are encountering some of these topics, the references here have been chosen to be as broadly accessible as possible.

Note: *All the material on this list should be freely accessible from within the Columbia network. If there are any issues obtaining access, please contact the instructor.*

Topic 1: Network science?

[1] **Collective dynamics of 'small-world' networks**, Watts & Strogatz, Nature 393, 440-442, 1998.

[2] **Exploring complex networks**, Strogatz, Nature volume 410, pages268–276, 2001.

[3] **The small-world phenomenon: An algorithmic perspective**, Kleinberg, Proceedings of the thirty-second annual ACM symposium on Theory of computing, 2000.

[4] **Emergence of scaling in random networks**, Barabasi & Albert, Science, Vol. 286, Issue 5439, pp. 509-512, 1999.

[5] **Towards a theory of scale-free graphs: Definition, properties, and implications**, Li et al, Internet Mathematics Vol. 2, Number 4, pp 431–523, 2005.

[6] **A first-principles approach to understanding the internet's router-level topology**, Li et al, SIGCOMM'04, pp 3–14.

Topic 2: Consensus and Averaging

[7] **Consensus and Cooperation in Networked Multi-Agent Systems**, Olfati-Saber, Fax, and Murray, Proceedings of the IEEE, Vol. 95, No. 1, 2007.

[8] **Coordination of groups of mobile autonomous agents using nearest neighbor rules**, Jadbabaie, Lin, and Morse, IEEE Transactions on Automatic Control, Vol. 48, Issue, 6, 2003.et al.

[9] **Flocking in fixed and switching networks**, Tanner, Jadbabaie, and Pappas, IEEE Transactions on Automatic Control, Vol. 52, Issue 5, 2007.

[10] **Fast linear iterations for distributed averaging**, Xiao and Boyd, Systems & Control Letters 53, pp. 65–78, 2004.

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[1]**Instructor:** James Anderson   ja3451@columbia.edu

[11] **A scheme for robust distributed sensor fusion based on average consensus**, Xiao, Boyd, and Lall, IPSN 2005. Fourth International Symposium on Information Processing in Sensor Networks, IEEE, 2005.

[12] **Fastest mixing markov chain on a graph**, Boyd, Diaconis, and Xiao, SIAM Review, Vol. 46, No. 4, pp. 667–689, 2004. *n.b. the link is to a more readable "full" version of the paper*

[13] **Graph weight allocation to meet laplacian spectral constraints**, Shafi, Arcak, and El Ghaoui, IEEE Transactions on Automatic Control, Vol. 57, No. 7, 2012.

Topic 3: Distributed control

[14] coming soon

Topic 4: Vehicle platoons

[15] coming soon

Topic 5: Optional topics – decided by student preference

[16]

Background material

Specific chapters will be listed ahead of class.

[i] **Lectures on dynamic systems and control**, Dahleh, Dahleh, and Verghese, MIT OpenCourse-Ware. *n.b. freely available thanks to MIT OpenCourseWare*

[ii] **Feedback systems: An introduction for scientists and engineers**, Astrom and Murray, Princeton University Press. *n.b. freely available thanks to Prof Richard Murray through his website*

[iii] **A course in robust control theory: a convex approach**, Dullerud and Paganini, Springer Verlag, 2000.