DA4600

Disrupting Dark Networks

Fall 2023
M, W – 10:00-11:50; Root 200C

Instructor: Sean Everton
E-Mail: **sfeverto@nps.edu**
Phone: 408-207-7444
Office: Root 203
Office Hours: By appointment (in person, Zoom, Teams, etc.)

Overview

This course focuses on covert and illegal dark networks, such as drug trafficking and terror networks. The course's first objective is to identify and describe these networks. We use various software packages to aid our identification and description efforts. The second is to design intervention strategies to disrupt, destabilize, and possibly destroy dark networks once you have identified and described them. The focus is on the tactical and operational levels, although the implications for strategic and policy levels may also inform our discussions.

The course has four sections. The first introduces the assumptions, concepts, and terms of social network analysis (SNA). The second covers how to code and manipulate social network data: the basics of social network analysis, so to speak. The third focuses on five different SNA "families" of metrics and/or algorithms: (1) network topography, (2) cohesive subgroups, (3) centrality, power, and prestige, (4) brokers and bridges, and (5) longitudinal networks. We may also have time to explore two types of computational text mining: (a) semantic network analysis and (b) topic modeling. The fourth and final section explores various strategic approaches for disrupting dark networks and asks students to craft three intervention strategies to disrupt, destabilize, or destroy the dark network they are analyzing (or if they are analyzing a light network, three strategies for making it more resilient and/or efficient).

The course involves a mixture of lectures, discussions, and hands-on experience (i.e., labs). Lectures dominate classes early in the quarter, but these will give way to class discussions and labs. Some class time will be devoted to class discussions of the assigned readings, so everyone should come to class prepared. However, since social network analysis is as much a series of techniques and methods as a body of theory, a large portion of class time will be spent on in-class labs or the data you are analyzing for your final projects.

I plan to record all classes using Zoom.

Requirements

Class participation – 5%
In-class Labs – 20% (credit/no credit)
Dark network project – 35%
Quizzes – 15%
Final Lab (take-home) – 25%

Grading Scale

A	95-100	C	74-76
A-	90-94	C-	70-73
B+	87-89	D+	67-69
B	84-86	D	64-66
B-	80-83	D-	60-63
C+	77-79	F	0-59

Important Dates (Tentative)

Week of October 8th (3rd week)

- Optional Class (Monday)
- Dark Network Project "Proposal" Due (Wednesday)

Week of October 22nd (5th week)

- Quiz #1 (Wednesday)

Week of October 29th (6th week)

- Dark Network Project I due (Friday)

Week of November 12th (8th week)

- Dark Network Project II due (Friday)

Week of November 19th (9th week)

- Final Lab Distributed (Monday)

Weeks of November 26th and December 3rd (10th and 11th weeks)

- Quiz (Monday, November 27th)
- Project Presentations & Tournament

Friday, December 15th, 5:00 pm

- Final Project and Final Lab Due

The Fine Print

Requirements

Students can work by themselves or form up to three-person teams. Each person or team will analyze a different network relationship and use the social network metrics introduced in class.

1. **Class Participation (5% of Final Grade):** The class's success depends on each member, including the instructor, doing their part. Each student should treat other students and the instructor with respect. ***Each team will present its dark network projects (see below).*** This does not have to be a formal presentation. You can use PowerPoint (or Keynote or Google Slides), but you don't have to.

2. **In-class Lab Assignments (20% of Final Grade):** There will be a series of in-class lab assignments completed and ***turned in by each student (not team)***. They will be due one week after handing them out in class and graded credit/no credit. Students are allowed (and encouraged) to work together, but everyone must turn in their own work.

3. **Analysis of a Dark Network (35% of Final Grade):** Each person or team will collect and record data on a dark or light network (this can be a network recorded for the *Visual Analytics* class and/or your thesis), which you will analyze and then develop three strategies for disrupting (for a dark network) or making it more resilient (for a light network).

    a. **Proposal (Informal)**: By the third week of the course, write a brief (e.g., a couple of sentences, a paragraph) summary of the dark or light network you intend to analyze.

    b. **Part I: Collecting and Recording of Dark Network (10% of Final Grade):** Each person or team will collect and record either a one-mode or two-mode social network ***plus*** attribute data of their chosen network. The number of networks and attributes each team codes will depend on team size. The following criteria serve as rough guidelines:

    - Single individuals: two relations (either one-mode or two-mode) and one attribute
    - Two-person teams: three relations (either one-mode or two-mode) and one attribute
    - Three-person teams: four relations (either one-mode or two-mode) and one attribute

    Individuals and teams can also record data about the Noordin Top terrorist network using the 2006 article on Noordin (***please see me before doing so***). Each person or group should submit the following:

    - A ***description*** of the sources from where the data were coded, including a description of how you defined your network's boundaries
    - ***Specific definitions*** of the relationship(s) and attribute(s) you coded (in other words, a miniature codebook)
    - A sociogram (network map) of each of the relationship(s) and attribute(s) you coded
    - Network matrices or edge lists (Excel, etc.) of the relationship(s) and attribute(s) you coded

    c. **Part II: Exploratory Analysis of Dark Network (10% of Final Grade):** Each person or team will aggregate and analyze two or more relations using the metrics (e.g., topography, identification of subnetworks, and brokerage) introduced in class. At a minimum, each person's or team's description should include the following:

    - A separate sociogram (network map) of each relationship
    - A general description (visual and metrics) of each network
    - A sociogram that aggregates these relations together
    - General description (visual and metrics) of the aggregated network
    - An explanation of what you think the analyses imply about the aggregated network and how it operates

d. **Part III: Strategic Analysis of Dark Network (15% of Final Grade):** Based on the examination of their network using Gephi, snExplorer, and R and drawing on the course readings, each person or team will develop and consider the viability of *three possible strategies/tactics* to disrupt and/or destabilize their dark network (or building up their light network). Each person or team will make a presentation in class and turn in a paper:

- Treat the final paper as a research paper. It should be approximately 20 pages long, ***excluding*** appendices and references, and describe your strategies/tactics for disrupting your dark network (or building up your light network). It should include the following:

  1. Abstract (or executive summary)
  2. Introduction
  3. Literature review (justifies the analysis you propose)
  4. Detailed description of the data (adapted from Part I – the sources of the data, the boundaries of your network)
  5. Presentation and discussion of your results (adapted from Part II)
  6. Strategies for Disruption (these need to flow ***directly*** from your analysis)
  7. Conclusion
  8. Appendix (e.g., codebook, additional tables and graphs, etc.)
  9. References should be ***in alphabetical order*** and a standard format (i.e., they should include enough information so anyone reading the paper can track them down).

- In your presentation, describe and defend your strategies. You may use PowerPoint, but you do not have to.

4. **Quizzes (15% of Final Grade):** There will be two short-answer quizzes to check your learning to date. I will distribute (probably virtually) the quizzes at the beginning of class, and you will have two hours to complete them. They will be open book, open note, open PowerPoint, and so on (but not open neighbor).

5. **Final Lab (25% of Final Grade):** A take-home final lab will be given at the end of the quarter that will cover lectures, labs, discussions, and assigned readings.

- Unlike the in-class labs, you will need to complete this lab independently. It will be made available in the 9th week.
- You can turn it in early for a "tentative" grade and then "redo" it if you wish to improve your grade for up to 2/3 of the points initially marked off.
- Please return the original lab submission along with your resubmission.

Software

We will primarily use one software package, ***Gephi***, a free, open-source, Java-based software written for Mac, PC, and Linux: https://gephi.org/. Its interface is available in several languages, including English, Spanish, French, and Japanese. Much of its functionality relies on "plugins," which are add-ons that allow researchers and programmers to develop additional tools and techniques. Gephi recognizes several network file formats and is excellent for visualizing large networks. Unfortunately, it does not include several metrics and algorithms available in other packages, so we will occasionally turn to others, such as ***snExplorer*** and ***R***.

snExplorer is an online social network package currently being developed by the CORE Lab, using what is known as a "Shiny app," which is a tool that allows us to harness the power and flexibility of ***R*** (see below) but still keep the user interface simple: https://corelab.shinyapps.io/shiny-snexplorer/.

We will sometimes use ***R***. Not too often, but when Gephi can't do what we want it to do. ***R*** is a software environment for statistical computing and graphics widely used among statisticians for developing statistical software and data analysis, including social network analysis. Two primary social network analysis software packages are available in R: *statnet* and *igraph*. When we use

R, the labs will include step-by-step commands to help keep things simple. When we don't use it, I will still include step-by-step commands, but these will be entirely optional. Download and install the most recent version of R here: https://cran.r-project.org/

We will use a few R packages/libraries designed for social network analysis. The two most common will be:

- **igraph** (https://igraph.org/) is a package that estimates primarily descriptive social network analysis statistics. You can calculate measures related to network topography, centrality, subgroups, brokers, and bridges, among others.
- **statnet** (https://statnet.org/) is a suite or "wrapper" of several SNA packages that provides users with many of the same descriptive measures (e.g., centrality) as **igraph** as well as functions to perform advanced modeling (e.g., ERGMs and SAOMs). Each package (e.g., **sna**, **network**, **ergm**) provides users unique functionality and is available after statnet is installed.

RStudio is an integrated development environment for R. It includes a console and a syntax-highlighting editor that supports direct script execution, as well as tools for plotting, history, debugging, and workspace management. It is available in open-source and commercial editions. It runs on the desktop (Windows, Mac, and Linux) or in a browser connected to RStudio Server or RStudio Server Pro (Debian/Ubuntu, RedHat/CentOS, and SUSE Linux). It makes the life of R users far easier. Download the most recent (and free) desktop version here: https://www.rstudio.com/products/rstudio/download/

Readings

One of the two following texts is required (chapter proofs are uploaded to Sakai):

- Sean F. Everton. 2012. *Disrupting Dark Networks*. Cambridge, UK: Cambridge University Press. Here's an online version: https://nps.primo.exlibrisgroup.com/discovery/fulldisplay?context=L&vid=01NPS_INST:01NPS&search_scope=MyInst_and_CI&tab=Everything&docid=alma991005457894403791
- Daniel Cunningham, Sean F. Everton, and Philip J. Murphy. 2016. *Understanding Dark Networks: A Strategic Framework for the Use of Social Network Analysis*. Lanham, MD: Rowman and Littlefield.

Other required readings (e.g., journal articles and book chapters) are available through NPS's Sakai/Collaborative Learning Environment (CLE) website – https://cle.nps.edu/xsl-portal).

The Writing of Research Papers

Academic Honesty: The NPS Student Information Handbook and Academic Honor Code state that all students are expected to complete their work, understand and avoid plagiarism, and follow NPS's academic integrity and honesty policy. Anyone found violating these standards will be punished. **The basic rule is to give others credit for their ideas and not misrepresent others' work, words, or creations as your own**. If you have any questions, ask before you submit your papers. **Note**: Since NPS is a government organization, not just an academic institution, you risk your entire career, not just your course grade, if you willfully violate the Academic Honor Code.

Graduate Writing Center: Consultation could involve brainstorming, dissecting readings, outlining, organization, argumentation, grammar, punctuation, citing, or paraphrasing. See https://my.nps.edu/web/gwc/meet-with-a-writing-coach. The Graduate Writing Center (GWC), located on the first floor of the Dudley Knox Library and at https://my.nps.edu/web/gwc, is a resource for all NPS students, regardless of their comfort or proficiency with academic writing. The center offers one-to-one coaching, hands-on workshops, and online and hard-copy reference materials to support students throughout their time at NPS.

Reasonable Accommodations for Students with Disabilities: Any student who feels they may need accommodation based on the negative impact of a disability on their work should contact their program officer and professor to discuss specific needs. Please see https://my.nps.edu/web/gwc/special-needs-reasonable-accommodation for more information.

Boilerplate

1. **Class Preparation:** Preparation is essential. Please complete the assignments (readings and exercises) before the class begins so you will get the most out of your educational experience (***including reading the syllabus***).

2. **Required Readings:** You are not expected to do the worked examples in any of the readings (e.g., in my "green" book). Instead, focus on the content discussed (e.g., topography, centrality).

3. **Arrive on Time:** Please try to get to class on time. Dealing with quirky software is hard enough, but concentrating when people rush to their seats, bump into chairs, and trip over and disconnect network cables is difficult.

4. **Lectures:** Lectures, when given, will not necessarily cover the reading material in-depth, so if you have questions, raise them in class or email me before class begins. If no questions are raised, I will assume you have understood the reading material, and I can move on to other issues and topics.

5. **PowerPoint Slides:** I will post all PowerPoint slides I present to Sakai, usually after class.

6. **Sakai Drop Box:** The drop box feature on Sakai is set up for you to upload digital copies of your papers, labs, and network data. ***Please upload them rather than email them to me*** because they are generally quite large due to their graphics.

7. **Portable File:** I use the portable file in Root 204 to return labs, papers, and other assignments. ***Do not place hard copies of your labs or papers in the portable file***; I might miss seeing them.

8. **Labs:** Labs are due before class begins one week after they are handed out unless you have been granted an extension due to unforeseen circumstances. ***When complete, upload them to Sakai through its drop box feature.*** Please don't email me digital copies; they tend to be quite large and fill up my inbox.

9. **Network data:** Network data should ***be zipped together*** and ***uploaded*** to Sakai.

10. **Final Project:** The final project is a research paper and should be written as one. It should include an introduction, a literature review justifying the analysis you propose, a description of the data, your results, a discussion of those results, and a conclusion. List references ***in alphabetical order*** and a standard format (i.e., they should include enough information that anyone reading the paper (not just me) can track them down). Finally, tables ***cannot be*** screenshots of output from Gephi, snExplorer, or R; you need to create your own (and only include metrics you plan to discuss). See the examples in the readings.

11. **Sample Papers:** I have uploaded well-written papers from previous classes to a folder on Sakai. These are provided to give you a sense of the variety of ways that dark networks can be disrupted using social network analysis and illustrate what a good paper looks like.

12. **Optional Readings:** I have included a series of optional readings in the syllabus. They are for future use (perhaps for your theses) or for those with the time and interest to explore topics beyond the required materials. Most are uploaded to the Sakai website. Some (e.g., book chapters) are not because of copyright restrictions; however, students interested in reading them can either borrow the book from me or check it out of the library.

Additional Resources

Below are a series of books, journals, and websites that you may find helpful now or in the future. As with the optional readings, some of you may find some useful for your thesis.

Texts

- Stephen P. Borgatti, Martin G. Everett, and Jeffrey C. Johnson. 2018. *Analyzing Social Networks*, 2nd ed. Los Angeles: SAGE.

- Wouter de Nooy, Andrej Mrvar, and Vladimir Batagelj. 2018. *Exploratory Social Network Analysis with Pajek*. 3rd ed. Cambridge, UK: Cambridge University Press.
- David Easley and Jon Kleinberg. 2010. *Networks, Crowds and Markets: Reasoning About a Highly Connected World*. New York and Cambridge: Cambridge University Press.
- Matthew O. Jackson. 2019. *The Human Network: How Your Social Position Determines Your Power, Beliefs, and Behavior*. New York: Pantheon Books.
- Charles Kadushin. 2011. *Understanding Social Networks: Theories, Concepts, and Findings*. Oxford and New York: Oxford University Press.
- David Knoke and Song Yang. 2008. *Social Network Analysis*, 2nd ed. Los Angeles: Sage Publications.
- Ian McCulloh, Helen Armstrong, and Anthony Johnson. 2013. *Social Network Analysis with Applications*. Hoboken, NJ: Wiley.
- Christina Prell. 2011. *Social Network Analysis: History, Theory & Methodology*. London and Thousand Oaks, CA: SAGE Publications.
- Garry L. Robins. 2015. *Doing Social Network Research: Network-based Research Design for Social Scientists*. London: SAGE.
- John Scott. 2017. *Social Network Analysis*. London and Thousand Oaks, CA: SAGE Publications Ltd.
- John Scott and Peter J. Carrington (eds.). 2011. *The SAGE Handbook of Social Network Analysis*. Los Angeles and London: SAGE Publications Inc.
- Stanley Wasserman and Katherine Faust. 1994. *Social Network Analysis: Methods and Applications*. Cambridge, UK: Cambridge University Press.

Journals

- *Connections*. Journal of the *International Network for Social Network Analysis (INSNA)*. Membership in INSNA includes a subscription to Connections. Web versions and many past issues are available at https://www.insna.org/connections
- *Journal of Social Structure* (2000-present). An electronic journal publishing work on social networks, some of which display options not available for print journals. Articles through 2017 are available for free at http://www.cmu.edu/joss/index.html; more recent issues can be found here: https://www.exeley.com/articles/1/42
- *Social Networks: An International Journal of Structural Analysis*: https://www.journals.elsevier.com/social-networks. Many of the more technical, methods-oriented articles about social networks appear here.

Websites

- International Network for Social Network Analysis website: http://www.insna.org/
- Social Network: http://en.wikipedia.org/wiki/Social_network
- Social Network Analysis: http://en.wikipedia.org/wiki/Social_network_analysis

Part I: Introduction to Social Network Analysis

Week 1: Class Overview (Monday)

Video

- Nicholas Christakis. 2010. "The Hidden Influence of Networks." *TED2010* [Video File]. http://www.ted.com/talks/nicholas_christakis_the_hidden_influence_of_social_networks?language=en

Required Readings

- Syllabus.

Optional Readings

- None.

Week 1: Introduction to Social Network Analysis and Dark Networks (Wednesday)

Audio (Weak and Strong Ties)

- Rhitu Chatterjee. 2023. "Why a Stranger's Hello Can Do More Than Just Brighten Your Day." *National Public Radio*: https://www.npr.org/sections/goatsandsoda/2023/08/23/1193148718/why-a-strangers-hello-can-do-more-than-just-brighten-your-day

Required Readings

- Valdis Krebs. 2002. "Mapping Networks of Terrorist Cells." *Connections* 24:43-52.
- Matthew O. Jackson. 2019. "Introduction: Networks and Human Behavior." Pp. 3-10 (Chapter 1) in *The Human Network*.

Optional Readings

SNA Introductions

- Stephen P. Borgatti, Ajay Mehra, Daniel J. Brass, Giuseppe Labianca. 2009. "Network Analysis in the Social Sciences." *Science*, Vol 323 (February 13): 892-895.
- Cunningham et al. 2016. "Social Networks" and "Strategic Options for Disrupting Dark Networks." Pp. 1-34 (Chapters 1 & 2) in *Understanding Dark Networks*.
- Wouter de Nooy, Andrej Mrvar, and Vladimir Batagelj. 2018. "Looking for Social Structure." Pp. 3-35 (Chapter 1) in *Exploratory Social Network Analysis with Pajek*.
- Sean F. Everton. 2012. "Social Network Analysis: An Introduction," and portions of "Strategic Options for Disrupting Dark Networks." Pp. 3-31, 38-45 (Chapters 1 & 2) in *Disrupting Dark Networks.*
- David Knoke and Song Yang. 2008. "Introduction to Social Network Analysis" and "Network Fundamentals." Pp. 1-14 (Chapters 1 & 2) in *Social Network Analysis*, 2nd ed.
- Christina Prell. 2011. "Becoming Familiar with Social Networks." Pp. 7-18 (Chapter 1) in *Social Network Analysis: History, Theory & Methodology*.
- John Scott. 2000. "Networks and Relations" and "The Development of Social Network Analysis." Pp. 1-37 (Chapters 1 & 2) in *Social Network Analysis: A Handbook*.
- Stanley Wasserman and Katherine Faust. 1994. "Social Network Analysis in the Social and Behavioral Sciences." Pp. 1-27 (Chapter 1) in *Social Network Analysis: Methods and Applications*.

- Wayne E. Baker and Robert R. Faulkner. 1993. "The Social-Organization of Conspiracy: Illegal Networks in the Heavy Electrical-Equipment Industry." *American Sociological Review* 58 (6):837-860.
- David A. Bright, Caitlin E. Hughes, and Jenny Chalmers. 2012. "Illuminating Dark Networks: A Social Network Analysis of an Australian Drug Trafficking Syndicate." *Crime, Law and Social Change* 57:151-76.
- Bonnie H. Erickson. 1981. "Secret Societies and Social Structure." *Social Forces* 60:188-210.
- Luke M. Gerdes (ed.). 2015. *Illuminating Dark Networks: The Study of Clandestine Groups and Organizations*. New York and Cambridge: Cambridge University Press.
- Peter Klerks. 2001. "The Network Paradigm Applied to Criminal Organisations: Theoretical Nitpicking or a Relevant Doctrine for Investigators? Recent Developments in the Netherlands." *Connections* 24:53-65.
- H. Brinton Milward and Jörg Raab. 2006. "Dark Networks as Organizational Problems: Elements of a Theory" *International Public Management Journal* 9(3): 333-360.
- Jörg Raab and H. Brinton Milward. 2003. "Dark Networks as Problems." *Journal of Public Administration Research and Theory* 13:413-439.
- Malcolm K. Sparrow. 1991. "The Application of Network Analysis to Criminal Intelligence: An Assessment of the Prospects." *Social Networks* 13:251-274.

Week 2: Exploring Gephi and R (Monday)

Required Readings

- Sean F. Everton. 2012. "Gathering, Collecting, Manipulating and Visualizing Social Network Data: The Basics." Pp. 76-132 (Chapter 4) in *Disrupting Dark Networks* **OR**
- Cunningham et al. 2016. "Collecting, Coding, and Manipulating Social Network Data." Pp. 35-57 (Chapter 3) in *Understanding Dark Networks*.

- Nancy Roberts and Sean F. Everton. 2011. "Strategies for Combating Dark Networks." Pp. 8-10. *Journal of Social Structure* 12 (2): http://www.cmu.edu/joss/content/articles/volume12/RobertsEverton.pdf.

Optional Readings

- David A. Bright, Russell Brewer, and Carlo Morselli. 2021. "Using Social Network Analysis to Study Crime: Navigating the Challenges of Criminal Justice Records." *Social Networks* 66:50-64.
- Tomás Diviák, Jan Kornelis Dijkstra, and Tom A.B. Snijders. 2019. "Structure, Multiplexity, and Centrality in a Corruption Network: The Czech Rath affair." *Trends in Organized Crime* 22(3): 274–297.

- Sean F. Everton, Nancy Roberts, and Dan Cunningham. 2013. *The Noordin Top Terrorist Network Code Book*.

Part II: Social Network Analysis: Basics

Week 2: Collecting and Recording Social Network Data; One-Mode Social Network Data (Wednesday)

Required Readings

- Stuart Koschade. 2006. "A Social Network Analysis of Jemaah Islamiyah: The Applications to Counterterrorism and Intelligence." *Studies in Conflict & Terrorism* 29:559-575.

Optional Readings

- Cunningham et al. 2016. "Collecting, Coding, and Manipulating Social Network Data." Pp. 35-57 (Chapter 3) in *Understanding Dark Networks*.

Social Network Analysis Lab

- Lab #1: One-Mode Social Network Data

Week 3: Two-Mode Social Network Data & Simplifying Social Networks

Required Readings

- Christina Prell. 2011. "Becoming Familiar with Social Networks." Pp. 59-91 (Chapter 1) in *Social Network Analysis*.

- Sean F. Everton. 2012. "Gathering, Collecting, Manipulating and Visualizing Social Network Data: The Basics." Pp. 76-132 (Chapter 4) in *Disrupting Dark Networks* **OR**
- Cunningham et al. 2016. "Collecting, Coding, and Manipulating Social Network Data." Pp. 57-79 (Chapter 3) in *Understanding Dark Networks*.

Optional Readings

- Wouter de Nooy, Andrej Mrvar, and Vladimir Batagelj. 2018. "Affiliations." Pp. 119-145 (Chapter 5) in *Exploratory Social Network Analysis with Pajek*.
- _____. "Attributes and Relations." Pp. 36-70 (Chapter 2) in *Exploratory Social Network Analysis with Pajek*.

Social Network Analysis Labs

- Lab #2: Two-Mode Social Network Data
- Lab #3: Simplifying Social Networks

Week 4: Aggregating Social Networks (Monday)

Required

- Sean F. Everton. 2012. "Gathering, Collecting, Manipulating and Visualizing Social Network Data: The Basics." Pp. 76-132 (Chapter 4) in *Disrupting Dark Networks* **OR**
- Cunningham et al. 2016. "Collecting, Coding, and Manipulating Social Network Data." Pp. 57-79 (Chapter 3) in *Understanding Dark Networks*.

Optional Readings

- None.

Social Network Analysis Lab

- Lab #4: Aggregating Social Networks

Part III: Social Network Analysis: Metrics and Algorithms

Week 4: Network Topography (Wednesday)

Required Readings

- Sean F. Everton. 2012. "Network Topography." Pp. 135-169 (Chapter 5) in *Disrupting Dark Networks* **OR**
- Cunningham et al. 2016. "Topographical Features of Dark Networks." Pp. 85-108 (Chapter 4) in *Understanding Dark Networks*.

- Kathryn Oliver. 2014. "Covert Networks: Structures, Processes, and Types." *Mitchell Centre Working Paper*. Manchester, UK: University of Manchester.

Optional Readings

- Bonnie H. Erickson. 1981. "Secret Societies and Social Structure." *Social Forces* 60:188-210.
- John Scott. 2000. "Points, Lines and Density." Pp. 63-81 (Chapter 4) in *Social Network Analysis: A Handbook*. Thousand Oaks, CA: Sage Publications.

Social Network Analysis Lab

- Lab #5: Network Topography

Week 5: Introduction to Dark Networks Game and Review (Monday)

Required Readings

- Michael E. Freeman. 2017. "Pushing the Envelope of Pedagogical Gaming: Dark Networks." *PS: Political Science and Politics* 50:1083-1088.

Optional Readings

- Sean F. Everton. 2012. "Network Topography, Key Players and Terrorist Networks." *Connections* 31:12-19.
- Sean F. Everton and Daniel Cunningham. 2013. "Dark Network Resilience in a Hostile Environment: Optimizing Centralization and Density." *Journal of Criminology, Criminal Justice, Law & Society* 16:1-20.

Week 5: Quiz #1 (Wednesday)

Required Readings

- None.

Optional Readings

- None.

Week 6: Detecting Subgroups (Monday)

Required Readings

- Sean F. Everton. 2012. "Cohesion and Clustering." Pp. 170-205 (Chapter 6) in *Disrupting Dark Networks* **OR**
- Cunningham et al. 2016. "Detecting Subgroups in Networks." Pp. 109-139 (Chapter 5) in *Understanding Dark Networks*.

Optional Readings

- Wouter de Nooy, Andrej Mrvar, and Vladimir Batagelj. 2018. "Cohesive Subgroups." Pp. 73-98 (Chapter 3) in *Exploratory Social Network Analysis with Pajek*.
- Robert Schroeder, Sean F. Everton, and Russell Shepherd. 2012. "Mining Twitter Data from the Arab Spring." *Countering Terrorism Exchange* 2:56-64.
- John Scott. 2000. "Components, Cores and Cliques." Pp. 100-122 (Chapter 6) in *Social Network Analysis: A Handbook*.
- Stanley Wasserman and Katherine Faust. 1994. "Cohesive Subgroups." Pp. 249-290 (Chapter 7) in *Social Network Analysis: Methods and Applications*.

Social Network Analysis Lab

- Lab #6: Detecting Subgroups

Week 6: Centrality and Power (Wednesday)

Required Readings

- Sean F. Everton. 2012. "Centrality, Power and Prestige." Pp. 206-252 (Chapter 7) in *Disrupting Dark Networks* **OR**
- Cunningham et al. 2016. "Identifying Central Actors in Networks." Pp. 141-168 (Chapter 6) in *Understanding Dark Networks*.

Optional Readings

- Phillip Bonacich. 1987. "Power and Centrality: A Family of Measures." *American Journal of Sociology* 92:1170-82.
- Wouter de Nooy, Andrej Mrvar, and Vladimir Batagelj. 2018. "Center and Periphery." Pp. 149-169 (Chapter 6) in *Exploratory Social Network Analysis with Pajek*.
- Tomás Diviák, Jan Kornelis Dijkstra, and Tom A.B. Snijders. 2019. "Structure, Multiplexity, and Centrality in a Corruption Network: The Czech Rath affair." *Trends in Organized Crime* 22(3): 274–297.
- Linton C. Freeman. 1979. "Centrality in Social Networks I: Conceptual Clarification." *Social Networks* 1:215-39.
- Noah E. Friedkin. 1991. "Theoretical Foundations For Centrality Measures." *American Journal of Sociology* 96:1478-504.
- Matthew O. Jackson. 2019. "Power and Influence: Central Positions in Networks." Pp. 11-43 (Chapter 2) in *The Human Network*.
- David Knoke and Song Yang. 2008. Pp. 62-72 in *Social Network Analysis*, 2nd ed.
- Gabriel Rossman. 2017. "Glory and Gore." *Contexts* 16:42-47.
- John Scott. 2000. "Centrality and Centralization." Pp. 82-99 (Chapter 5) in *Social Network Analysis: A Handbook*.
- Stanley Wasserman and Katherine Faust. 1994. "Centrality and Prestige." Pp. 167-219 (Chapter 5) in *Social Network Analysis: Methods and Applications*.

Social Network Analysis Lab

- Lab #7: Centrality and Power

Week 7: Centrality and Prestige (Monday)

Required Readings

- Sean F. Everton. 2012. "Centrality, Power and Prestige." Pp. 206-252 (Chapter 7) in *Disrupting Dark Networks* **OR**
- Cunningham et al. 2016. "Identifying Central Actors in Networks." Pp. 141-168 (Chapter 6) in *Understanding Dark Networks*.

Optional Readings

- Phillip Bonacich. 1987. "Power and Centrality: A Family of Measures." *American Journal of Sociology* 92:1170-82.
- Wouter de Nooy, Andrej Mrvar, and Vladimir Batagelj. 2018. "Prestige." Pp. 225-243 (Chapter 9) in *Exploratory Social Network Analysis with Pajek*.
- Linton C. Freeman. 1979. "Centrality in Social Networks I: Conceptual Clarification." *Social Networks* 1:215-39.
- Noah E. Friedkin. 1991. "Theoretical Foundations For Centrality Measures." *American Journal of Sociology* 96:1478-504.
- Matthew O. Jackson. 2019. "Power and Influence: Central Positions in Networks." Pp. 11-43 (Chapter 2) in *The Human Network*.
- David Knoke and Song Yang. 2008. Pp. 62-72 in *Social Network Analysis*, 2nd ed.
- John Scott. 2000. "Centrality and Centralization." Pp. 82-99 (Chapter 5) in *Social Network Analysis: A Handbook*.
- Stanley Wasserman and Katherine Faust. 1994. "Centrality and Prestige." Pp. 167-219 (Chapter 5) in *Social Network Analysis: Methods and Applications*.

Social Network Analysis Lab

- Lab #8: Centrality and Prestige

Week 7: Bridges and Brokers (Wednesday)

Required Readings

- Sean F. Everton. 2012. "Brokers, Bridges, and Structural Holes." Pp. 253-285 (Chapter 8) in *Disrupting Dark Networks* **OR**
- Cunningham et al. 2016. "Brokerage Within Networks." Pp. 169-193 (Chapter 7) in *Understanding Dark Networks*.

Optional Readings

- Stephen P. Borgatti. 2006. "Identifying Sets of Key Players in a Social Network." *Computational, Mathematical, and Organizational Theory*. 12(1): 21-34.
- Ronald S. Burt. 1992. "The Social Structure of Competition." Pp. 57-91 in *Networks and Organizations: Structure, Form and Action*, edited by Nitin Nohria and Robert G. Eccles. Boston: Harvard University Press.
- _____. 1992. *Structural Holes*. New York and Cambridge: Cambridge University Press.
- Daniel Cunningham, Sean F. Everton, Gregory Wilson, Carlos Padilla, and Douglas Zimmerman. 2013. "Brokers and Key Players in the Internationalization of the FARC." *Studies in Conflict & Terrorism* 36:477-502.
- Wouter de Nooy, Andrej Mrvar, and Vladimir Batagelj. 2018. "Brokers and Bridges." Pp. 170-196 (Chapter 7) in *Exploratory Social Network Analysis with Pajek*.
- Mark Granovetter. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 73:1360-1380.

Social Network Analysis Lab

- Lab #9: Brokers and Bridges

Week 8: Longitudinal Networks (Monday)

Required Readings

- Sean F. Everton. 2012. "Dynamic Analysis of Dark Networks." Pp. 319-333 (Chapter 10) in *Disrupting Dark Networks*.

Optional Readings

- Wouter de Nooy, Andrej Mrvar, and Vladimir Batagelj. 2018. "Sentiments and Friendship." Pp. 99-118 (Chapter 4) in *Exploratory Social Network Analysis with Pajek*. Cambridge, UK: Cambridge University Press.

Social Network Analysis Lab

- Lab #10: Longitudinal Networks

Week 8: Text Mining (Wednesday)

Required Readings

- None.

Optional Readings

- None.

Social Network Analysis Lab

- Lab #11: Text Mining (optional)

Part IV: Strategies for Disrupting Dark Networks

Week 9: Probability and Strategies, Review (Monday)

Required Readings

- Sean F. Everton. 2012. "Strategic Options for Disrupting Dark Networks." Pp. 32-46 (Chapter 2) in *Disrupting Dark Networks.*
  OR
- Cunningham et al. 2016. "Strategic Options for Disrupting Dark Networks." Pp. 23-34 (Chapter 2) in *Understanding Dark Networks.*

Discussion Readings (Required)

- Rueben Morris. 2023. *Cracking the Code: Strategies to Counter Maximalist Movements in the Modern Era*. NPS: Monterey, CA (Available on Sakai – Part III, Example Readings)
- Kelley Jhong. 2022. *Chinese Investments in the Big Data Industry*. NPS: Monterey, CA (Available on Sakai – Part III, Example Readings)

Optional Readings

Disruption

- Paul A. Duijn, Victor Kashirin, and Peter M. A. Sloot. 2014. "The Relative Ineffectiveness of Criminal Network Disruption." *Scientific Reports* 4:1-15.
- Jenna Jordan. 2009. "Attacking the Leader, Missing the Mark: Why Terrorist Groups Survive Decapitation Strikes." *International Security* 38:7-38.
- Peter Klerks. 2001. "The Network Paradigm Applied to Criminal Organisations: Theoretical Nitpicking or a Relevant Doctrine for Investigators? Recent Developments in the Netherlands." *Connections* 24:53-65.

- Nancy Roberts and Sean F. Everton. 2011. "Strategies for Combating Dark Networks." *Journal of Social Structure* 12: http://www.cmu.edu/joss/content/articles/volume12/RobertsEverton.pdf.
- _____. 2016. "Monitoring and Disrupting Dark Networks: A Bias Toward the Center and What It Costs Us." Pp. 29-42 in *Eradicating Terrorism from the Middle East*, ed. by Alexander R. Dawoody. New York: Springer.
- Malcolm K. Sparrow. 1991. "The Application of Network Analysis to Criminal Intelligence: An Assessment of the Prospects." *Social Networks* 13:251-274.
- Eric P. Wendt. 2005. "Strategic Counterinsurgency Modeling." *Special Warfare* (September): 2-13.

Prediction

- Dan Gardner. 2011. "Introduction." Pp. 1-28 (Chapter 1) in *Future Babble: Why Pundits Are Hedgehogs and Foxes Know Best*. New York: Plume.
- Nate Silver. 2012. *The Signal and the Noise: Why Most Predictions Fail but Some Don't*. New York: The Penguin Press.
- Philip E. Tetlock and Dan Gardner. 2015. *Superforecasting: The Art and Science of Prediction*. New York: Crown.

Week 10: Quiz (Monday)

Required Readings

- None.

Optional Readings

- None.

Weeks 10 & 11: Project Presentations, Dark Networks Tournament (Beginning Wednesday)

Required Readings

- None.

Optional Readings

- None.