Course Outline: Cybernetics, Complexity, Chaos, and Critical Theory

Course Description: Cybernetics, complexity theory, and chaos theory emerged in the mid-twentieth century from the scientific study of systems exhibiting dynamic behavior and challenging to predict or control using linear methods. This course explores the intersections of these three fields with critical theory and continental philosophy. Students will examine the intellectual foundations and implications of “the three C’s,” with a focus on understanding concepts such as system, feedback, emergence, phase changes, dissipative structures, bifurcation, attractors, self-organization, chaos and catastrophe. Particular attention will be given to the points where cybernetics, complexity, and chaos thinking intersect with strands of critical social theory. Examples include the role of heterodox Marxist Alexander Bogdanov as a precursor of systems thinking; the influence of cybernetics on Foucault, Deleuze, and Guattari; the feminist cybernetics inaugurated by Donna Haraway and Sadie Plant; the relation of complexity theory to concepts of intersectionality; and the place of chaos and complexity theory in the analysis of the “polycrisis” of contemporary capitalism and the search for radical alternatives.

Instructor: Nick Dyer-Witheford, ncdyerwi@uwo.ca. Office Hours: Zoom, by appointment.

Requirements: (subject to revision dependent on enrollment)
1 in class presentation: 25%
1 paper proposal: 700 words including bibliography 10%
1 major research paper 7000 words including bibliography 50%
Seminar participation: 15%
For further information see “Notes on Evaluation” below.

Schedule of Topics and Readings

This schedule may be adjusted after the first week of classes to reflect participant interests.

Readings will be available as downloadable PDFs on the seminar OWL site.

Schedule of Topics and Readings

Week 1) Systems: We begin by reviewing our collective interest in and knowledge of cybernetics and complexity theory looking at recent landmark discussions of these concepts, and outlining the topics the seminar will cover, starting with the mid-20th century emergence of "systems" thinking. Readings: Voss, G. (2024) *Systems Ultra: Making Sense of Technology in a Complex World*, Chapter 1; Geoghegan, B.D. (2023) *Code: From Information Theory to French Theory*, “Introduction”; Hui Y (2024) “Why Cybernetics Now” in Hi ed Cybernetics for the Twenty First Century.


Week 3) Deviations: Various thinkers and movements responded to cybernetics’ alignment with the US military industrial complex by attempts at reappropriation. We examine the heretical cyber-socialism of Stafford Beer and the counterculture adoption of cybernetics. Readings: Pickering, A


**Week 7) Assemblages:** In parallel with this development, Deleuze and Guattari’s concepts of assemblage, rhizomes and flows is now understood was an extraordinary translation of complexity theory in the language of social and psychoanalytic theory, suffused with a radicalism that many of their interpreters attempt to discard. Readings: DeLanda, M (1991) ‘Nonorganic Life’; Protevi J (2006) “Deleuze, Guattari and Emergence”; Deleuze G and Guattari F (1987) “Rhizomes”; Guattari F Three Ecologies.

**Week 8) Autopoiesis:** Complexity concepts also overtook the cybernetic concept of “autopoiesis” developed by Chilean biologists Humberto Maturana and Francisco Varela, and then transferred to the realm of social science by stems theorist Niklas Luhmann, and then challenged by way microbiologist Lynn Margulis concept of symbiogenesis by Haraway’s idea of “sympoeisis”.Readings: Maturana H and Varela F (1972) Autopoiesis and Cognition: The Realization of the Living (extracts); Luhmann N (1995) [1984]; Haraway D (2016), Staying with the Trouble : Making Kin in the Chthuluocene, Chapter 3.

**Week 9) Markets:** Complexity theory is widely interpreted as vindicating the neoliberal revival of “free market” capitalism. However, this view is challenged from the left by the new iterations cybernetic planning theory and by applications of complexity theory to issues of intersectional

**Week 10) Polycrisis:** Since 2020 amidst pandemic, war and global boiling version of complexity theory has been popularized via the notion of a civilizational “polycrisis,” a term passed from the work of Edgar Morin to elite discussions at Davos, and thence in the work of contemporary historian Adam Tooze, in a discourse with ominous echoes of earlier theories about “the collapse of complex societies”. Readings: Morin E extract from (1999). Homeland earth: a manifesto for the new millennium, Tooze A (2022) “What is the Polycrisis” and “Crisis Pictures”; Bardi, U., et al. (2019). “Toward a General Theory of Societal Collapse.”

**Week 11) Neo-cybernetics:** At the same time, a wave of neo-cybernetics, integrating complexity theory and cybernetics, with an emphasis on thermodynamics, ecology, and evolutionary processes. Can this new synthesis provide part of the theoretical repertoire for a new wave of emancipatory social struggles against disaster? Readings: Hui Y (2024) “Machine and Ecology”; Hayles K (2024) “Detoxifying Cybernetics: From Homeostasis to Autopoiesis and Beyond”; other texts TBD.

**12) Plenary:** In the final session, we shall workshop participants’ term paper proposals.

**Presentation Topics:** Seminar participants will give presentations selected from a list of possible topics and supporting readings; or may ask to present on other readings from the course syllabus; or propose their own topic for approval by the instructor. The aim of the presentation is to make your topic legible to other seminar participants.

The list of suggested presentation topics will include topics such as Wiener and Leibniz; cybernetics in China; Canguilhem and cybernetics Lacan and cybernetics; Foucault and cybernetics; Parisi on cybernetics and AI; “systems thinking” and the Vietnam war; “systems thinking” and the Club of Rome report; Simondon on cybernetics and metastability; anarchism and cybernetics; the Habermas – Luhmann debate on social systems; Margulis and symbiogenesis; Malabou on plasticity, catastrophe and cyberanarchy; Turchin on “ultrasociety” and Cliometrics; Tainter and “the collapse of complex societies”; Wark on Bogdanov and tektology; Marxism and polycrisis; Keller on “self-organization”; intersectionality and complexity theory; Varela and autopoiesis; Stengers on complexity and capitalism; Hui on cosmotechnics.

**Working Bibliography:** Includes both required readings and other texts useful for presentations and essays; further items to be added.


Wiener, N (1954)The Human Use of Human Beings. New YorK: Da Capo,