**The Ohio State University Freshman Seminar Program – Arts & Sciences 1138. \_\_\_ (Proposal) Autumn 2021 Room TBD Science Building**

**Title: *Network Science – Connections That Mean The World***, 1 cr., S/U, TBD

Chart

Description automatically generated**Description:** Networks are used to analyze, understand and predict phenomena in a wide range of disciplines. The most prominent recent example is network epidemiology – the use of networks to understand the spread of infectious diseases like Covid. Some other examples are predator-prey networks in biology, social networks as found on Facebook, and trade networks. Network science is a relatively young field, and we will study its development. We will follow intrepid young physicist Duncan Watts as he struggles with finding a topic and advisor in graduate school, and goes on to write one of the seminal papers in network science.

Students will not just learn about networks, but also about the process of doing science and the emergence of a new field.

**Instructor:** Dr. Sabine Jeschonnek, Professor of Physics, Lima Campus, [jeschonnek.1@osu.edu](mailto:jeschonnek.1@osu.edu), (567) 242 7165, office 310A Science Building.

**Course goals:**

1. To understand a network and its properties, e.g. centrality of nodes
2. To examine the application of networks in various disciplines
3. To gain experience reading scientific papers under the guidance of the instructor
4. To learn about the process of scientific research
5. To give a short presentation about a network simulation or paper of the student’s choice at the end of the semester

**Meeting times:** TBD. For this 1 credit course, we will meet once per week for an hour. You are expected to spend 2 additional hours a week preparing outside of class (reading, watching videos, running computer simulations, preparing a short presentation).

**Grading and Assignments:** Satisfactory/Unsatifactory

Class Attendance & Participation: 20%   
Micro Report on a Network Concept: 20%, due by Week 8  
Micro Report on a Simulation or Article: 20%, due by Week 11  
Oral Presentation on a Simulation or Article: 40%, in Weeks 13 and 14

A list of network concepts, articles, and simulations to choose a topic from will be provided. Students may also choose their own simulation or article after consulting with the instructor.

**Weekly topical outline:**

Week 1 What is a Network?

Week 2 Networks in Literature: From the Game of Thrones to Shakespeare

Week 3 History of Networks, Paul Erdos; Random Networks

Week 4 Small World Networks; Social Networks

Week 5 Scale-free Networks

Week 6 Time dependent networks; “the rich get richer” phenomenon

Week 7 Dynamics on Networks: spread of epidemics

Week 8 Dynamics on Networks: spread of ideas

Week 9 Modeling Dynamics on Networks

Week 10 Networks in Trade & Finance: Banks - too central to fail?

Week 11 Networks in Biology and Medicine

Week 12 Zoom interview with a Network Scientist

Week 13 Student presentations 1

Week 14 Student Presentations 2

Week 15 Looking back, discussion

**Required Materials:**

1. **Book: Six Degrees: The Science of a Connected Age, Duncan Watts (2004)**Paperback, ca $16 on Amazon, $10 for Kindle version.
2. **Supplementary Material (free)**
3. Network Literacy: Essential Concepts and Core Ideas (free)

<https://sites.google.com/a/binghamton.edu/netscied/teaching-learning/network-concepts>

1. Laszlo Barabasi: Network Science (free) <http://networksciencebook.com/>
2. **Additional Readings from the network literature will be assigned each week, and will be provided on Carmen**
3. **Videos and Interactive Simulations; links will be provided on Carmen**

**Brief Biographical Paragraph:**

Dr. Sabine Jeschonnek is a professor in the department of Physics. She received her undergraduate and graduate degrees in Germany, studying theoretical nuclear physics. She then was a Visiting Scientist at MIT and a postdoctoral scholar at Jefferson Lab in Newport News, VA, before joining OSU Lima. She has conducted research in electron scattering from light nuclei and quark-hadron duality for over 20 years. During the past few years, she has developed a new research interest: the science of networks. She thoroughly enjoys this young, interdisciplinary field and has done some work on spatial economic networks. She would like to share her enthusiasm for doing science and discovering cool new applications for networks with new OSU students in this freshman seminar.

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DISABILITY SERVICES. Anyone who feels the need for an accommodation based on the impact of a disability should contact one of us for an appointment, **no later than the second week of class**. At the appointment, we can discuss the course format, anticipate your needs, and explore potential accommodations. We rely on the Office for Disability Services for assistance in verifying the need for accommodations and developing such strategies. If you have not previously contacted the Office for Disability Services, we encourage you to do so. **Note:** It is your responsibility to make your accommodation needs known to faculty. If a student with a disability does not request accommodations, instructors are under no obligation to provide accommodations.