Summer 2017

Soc 898 Syllabus (Special Topics). Social Psychological Processes in the STEM Classroom: Activating STEM Identities Summer 2017

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Soc 898 Syllabus (Special Topics)
Social Psychological Processes in the STEM Classroom:
Activating STEM Identities
Summer 2017

Instructors:

- Dr. Patricia (Trish) Wonch Hill, Social and Behavioral Science Research Consortium, phill3@unl.edu
- Dr. Julia McQuillan Department of Sociology, jmcquillan2@unl.edu

Description:

This class covers a broad range of social psychological topics and processes to help teachers better understand how social context impacts STEM learning. Students will learn about social inequality in STEM fields, and the individual, interactional, and institutional barriers to developing a science identity for youth from a variety of social locations (rural/urban, gender, race/ethnicity, Socioeconomic Status, ELL). The class will learn about implicit bias, stereotype threat, and identity theory, and how they impactformal and informal social interactions and learning in the STEM classroom. They will learn and help formulate practical strategies to reduce their negative impact in order to broaden and widen student engagement in STEM.

Learning Objectives:

- Teachers will understand the utility of social psychological concepts in their efforts to help youth become more interested in STEM.
- Teachers will learn to use a sociological lens to identify how social structural forces influence youth identification with STEM.
- Teachers will identify ways to use identity theory concepts and principles to activate youth STEM youth.
- Teachers will create tools to integrate what they've learned about STEM identity into education practices.

Assessment:

1. Fact Sheet: Science Translation & Communication that translates a social science concept/theory finding FOR teachers in a format that facilitates understanding (each class participate will have a unique topic) (10% draft due July 14th; 10% draft presentation due July 20th, 10% final due July 21st)
2. Intervention/Action Plan: Develop a plan of action to alter teaching practice, classroom environment, or classroom activity, that is new that will help to activate stem identities for all youth, or will engage all/more youth with STEM (integrating identity into education) with a planfor evaluating if the action was effective for reaching the intended goal (and no unintended consequences) (each class participant will have a unique action plan) (10% draft due July 14th; 10% draft presentation due July 20th, 10% final due July 21st)
3. Journaling/reactions/questions/ideas (20%)
4. Effective and constructive class participation (20%)

Class Structure – Schedule

Our classroom time together will loosely follow this structure. There will be breaks every hour, with a longer coffee break at around 2 o'clock.

Meditation – Journal Reflection – Introduction of Content
Video – Lecture - Classroom Discussion
Reading Presentation/Discussion
Project worktime (Groups/Peers/Individual)

Readings

Reading 1: Cast, D. Alicia and Jan E. Stets. 2016. The Self. *Handbook of Contemporary Sociological Theory.* Ed. S. Abrutyn. Springer International Publishing. Switzerland.

Reading 2: Tan, E. & **Calabrese Barton A.** (2007). From peripheral to central, the story of Melanie's metamorphosis in an urban middle school science class. *Science Education* 92(4), 567-590.

Reading 3 **Carlone, H.B.**, Scott, C., & Lowder, C. (2014). Becoming (less) scientific: A longitudinal study of students' identity work from elementary to middle school science. *Journal of Research in Science Teaching, 51*(7), 836-869.

Reading 4: Brickhouse, N. W., Schultz, K., & Lowery, P. (2000). What kind of a girl does science? The construction of school science identities. *Journal of Research in Science Teaching, 37,* 441-458.

Reading 5: Archer, Louise, Emily Dawson, Jennifer DeWitt, Amy Seakins, and Billy Wong. 2015. "ScienceCapital": A Conceptual, Methodological, and Empirical Argument for Extending Bourdieusian Notions of Capital Beyond the Arts. *Journal of Research in Science Teaching*. 52:7:922-948.

Reading 6 **Tan, E.**, Calabrese Barton, A., Kang, H., & O'Neil, T. (2013). Desiring a career in STEM fields:Girls' Narrated and Embodied Identities-in-practice. *Journal of Research in Science Education*, 50(10), 1143-1179.

Reading 7: Hill, Patricia Wonch, Julia McQuillan, Eli Talbert, Amy Spiegel, G. Robin Gauthier, and JudyDiamond. 2017. Science Possible Selves and the Desire to be a Scientist: Mindsets, Gender Bias, and Confidence during Early Adolescence. *Social Sciences*. 6:55.

Reading 8: Gershenson, Seth, Stephen B. Holt, and Nicolas Papageore. 2015. Who Believes in Me? The Effect of Student-Teacher Demographic Match on Teacher Expectations. *Economics of Education Review*: 52:209-224.

Reading 9: Wilson, Kimi. 2016. Exploring an Integrative Lens of Identity for a High School MathematicsTeacher. *Journal of Urban Learning Teaching and Research*. 12:164-173.

Reading 10: Avraamidou, Lucy. 2014. Studying Science Teacher Identity: Current Insights and FutureResearch Directions. *Studies in Science Education*. 50:2:145-179.

Note: This class was offered in the summer through the Center for Science, Math, and Computer Education (CSMCE) at the University of Nebraska. CSMCE recruited teachers, scheduled the classes, conducted daily evaluations of the class, handled the grant funds to pay for teacher tuition. There was a pilot version of the class as an "Institute" for four days with teachers to learn what would be useful in a graduate class for credit in the year before running the class. We held this class in two summers (with a "gap" year in between). Middle and high school science and math teachers from urban and rural communities in Nebraska took the classes.

SOCI 898 Syllabus (Special Topics)
Systems and System Models: Using Network Science in 6-12 Education
Summer 2021

Course Format: web-conferencing (zoom), typically 8am-9:30am, 10:30am-noon with other tasks for the in-between time, and daily homework. **All materials, assignments, etc., will be in Canvas, organized in the Modules.**

Instructors:
- Dr. Wendy Smith (she/her/hers), wsmith5@unl.edu
- Dr. Julia McQuillan (she/her/hers), jmcquillan2@unl.edu

Assistants
- Meghan Leadabrand (she/her/hers), Worlds of Connections Project Coordinator and Course Assistant, mleadabrand2@unl.edu (Please include on emails to Dr. McQuillan)
- Mary Herrington (she/her/hers), Culler Middle School Science Teacher and Advisory Board Member for Worlds of Connections
- Sarah Gergen (she/her/hers), Irving Middle School Science Teacher and Advisory Board Member for Worlds of Connections

Description:
This course is intended for secondary STEM teachers and will apply concepts of network science to systems and system models; explore activities designed to help students understand systems, systems models, and how network science concepts can reveal how systems operate; understand modeling situations and careers that intersect with network science; understand key concepts and terms related to systems and system models; apply concepts of systems and system models to teacher professional networks, student networks, and how network connections impact teacher and student learning and risk-taking; and explore developmentally appropriate phenomena with wide relevance to secondary students for applying systems and systems models (e.g. water).

Learning Outcomes:
At the end of this class, the teacher participants will:
- Apply concepts of network science to systems and system models (NGSS cross-cutting concept 4)
- Explore activities designed to help students understand systems, systems models, and how network science concepts can reveal how systems operate
- Understand modeling situations and careers that intersect with network science
- Understand key concepts and terms related to systems and system models
- Apply concepts of systems and system models to teacher professional networks, student networks, and how network connections impact teacher and student learning and risk-taking.
- Explore developmentally appropriate phenomena with wide relevance to students for applying systems and systems models

Books and Materials (provided):
- *Thinking in Systems* by Donella H. Meadows
- *Linked* by Albert-László Barabási (We will send a copy; it is available in audio format)
- Other pdfs and online articles supplied via Canvas, including *Network Science* by Albert-László Barabási

Assignments & Rubrics
Most assignments can be completed in a format of your choice, such as a typed document, scan/photo of handwritten document, screencast/narrated slides, or video/audio recording. Given the format of the summer course, most assignments are due the next day before class starts (by 7:30am central time). However, we will not deduct points for late work: the grades on the assignments are meant to reflect your displayed learning and engagement with the material. Your learning experience will be maximized if you complete each day's assignment before the next class. **June 30 is the last day to submit any assignments**; after that final grades will be submitted.

Our goal for this course is that you learn and master the learning objectives. Thus, all assignments can be revised and resubmitted if you earn less than full credit on your initial submission. We strongly recommend meeting with an instructor to discuss your feedback and revision plans prior to submitting a revision. The final day to submit revisions is June 30.

- **Syllabus Quiz:** This is a short but intense course. We want to make sure you understand the important information on the syllabus. There are 5 questions, and unlimited attempts are allowed. Please retake the quiz until you get 100%.
- **Daily classwork activities**: each day of class will feature a number of in-class activities related to systems thinking and network science. A typical day will include: (1) discussion of the previous night's homework; (2) network science or systems thinking activity; (3) videos to watch and discuss/reflect on; (4) an additional activity or guest speaker, followed by a verbal or written discussion/reflection.
    - 3 points: fully and thoughtfully engaged in the day's activities, completing the necessary tasks and submitting any required parts
    - 2 points: fully engaged in the day's activities, completing the necessary tasks and submitting any required parts, but reflection is "surface level" that does not reach the depth of "thoughtful", or engagement in one activity was lacking.
    - 1 point: engaged in some of the day's activities but did not complete them all or did not submit the required parts; reflection may be missing. Engagement is lacking.
    - 0 points: did not do the activities.
- **Course Readings/Discussion Board Posts:** most nights (e.g., outside of class time) you will be asked to read a few chapters or articles pertaining to systems thinking or network science, and be prepared to discuss those readings the next class [the in-class discussion will be counted as one of the daily activities, see above]. In addition, most nights (outside of class time) you will be asked to respond to some discussion board prompts to reflect on the topics of the day. Many of the discussions will ask you to consider how the topics from that day's activities might apply to your own work as a teacher. Your discussion board responses can be written or you can record audio/video to capture your reflection. You are welcome but not required to reply to each other's discussion board posts.
    - 3 points: thoughtful reflection responds to all of the question prompts thoroughly
    - 2 points: reflection responds to all of the question prompts at least a little; or thoughtful reflection responds to most of the question prompts
    - 1 point: overly brief response ignores some of the question prompts
    - 0 points: no response submitted.
- **Network Science Dictionary:** this is a whole-class project in which we collaboratively develop a dictionary of network science terms. Each participant in the course will create two entries in the network science dictionary (one each week of the course). You can work as a group; a group of N people needs to complete 2N entries (two per person).
    - 5 points: word/phrase is defined, there are at least two examples, a non-example (if applicable), an illustration or image (if applicable), and links to at least two different websites that use, define, or otherwise provide helpful information for the word/phrase
    - 4 points: nearly all the 5-point characteristics are there, but there may only be one example or website linked
    - 3 points: the word/phrase is defined at least in part, but may be incomplete; other information added to the slide may be sparse or incorrect
    - 2 points: the word/phrase is fully or partially defined but little else is added to the slide, or what is added is incomplete or incorrect
    - 1 point: an incomplete definition is provided for the word/phrase; examples and links may be missing or incorrect
    - 0 points: blank
- **Final Project:** The final project can be completed in groups of 1-3. Select one of the following two options, or meet with the instructors to propose a third option.
    1. **OPTION 1: Student focused lesson(s):** You will take one or more of the concepts from this course and develop a multi-day lesson/unit to use with your students. You can start from a unit you already teach, and for the assignment, add or make more explicit the systems thinking habits and/or network science. Specify the target course. Connect the lesson to state/district standards

for math/science, and include learning objectives, descriptions of the activities, any accompanying materials (slides, worksheets, videos, etc.), and how you will assess students (including questions to ask during class, formative assessment such as exit tickets or homework assignments, and summative assessment). There should be clear connections to system thinking and/or network science throughout the lessons.

2. **OPTION 2: Teacher/Peer focused workshop.** You will take one or more of the concepts from this course and create a workshop/presentation that you could present to peers to convey the value of systems and systems thinking/networks (e.g. to start a club on the topic or to bring concepts into classes) (such as at your district or at NATS/NATM/NETA; part of a PLC or building/grade level meeting). You can choose habits of system thinkers or network science (or both). Your workshop materials should include learning outcomes for the participants (and specify your target audience), activities the participants will do, materials (such as slides, videos, handouts) that you would use, assessment (what questions will you ask, how will you know what the participants have learned?). You can determine the appropriate level of information (is your audience new to these concepts or just working to refine/improve?).

FOR BOTH OPTIONS:

- Your group will give a 10-15 minute presentation about your project on the final day of class (July 18), providing highlights of the main points. You will get instructor and peer feedback in class. Your full projects can be submitted until June 30.
- Presentation Rubric
    - 5 points: clear network science/systems thinking goals; presentation gives main ideas about the topic, learning objectives, activities, and assessments, as well as how the topic fits in the existing curriculum [for student lessons].
    - 4 points: presentation is clear for the major components, but they may be lacking a little cohesion.
    - 3 points: presentation is mostly clear, but sometimes delves too far into details, or is missing 1-2 of the major components.
    - 2 points: presentation is missing some components, may be hard to follow in places, may not present coherent lessons.
    - 1 point: presentation is missing most components and is hard to follow; little connection to secondary STEM curriculum or what teachers should know.
    - 0 points: did not present
- Lessons/Workshops: points for each of the major components (a) learning objectives; (b) & (c) 2 activities; (d) accompanying materials; (e) assessment
    - 5 points: component is present, coherent, clear, and complete
    - 4 points: component is present and clear but potentially not coherent with other components, or slightly incomplete.
    - 3 points: component is present but not entirely clear or complete; may not align with other components
    - 2 points: component is somewhat present but not very clear, may be incomplete or not align with other components
    - 1 point: component is barely present or incorrect
    - 0 points: missing

Other Important Information

Our online classroom is a safe and inclusive place for all. Every individual is valued, has the capability to succeed and has something to offer the class. Know that we are always here for you and that our (virtual) doors are always open. Participants in this course have different backgrounds and thus different background knowledge and experiences. Everyone always has something they can contribute to the discussions, even if the main contribution is to ask clarifying questions.

UNL Sociology welcomes students from around the world and recognizes the unique perspectives international students bring to enrich the campus community. If your first language is not English and/or you are an international student, please come and talk to us about specific ways we can support you. For more information on campus-wide resources, visit https://isso.unl.edu/

This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is indicated on the class roster, please let us know. We will be asking everyone to share their pronouns, and to rename themselves in Zoom to include their pronouns and preferred name.

You are expected to attend all Zoom sessions daily. If an emergency arises and you need to miss class, please notify the instructors immediately. We will do our best to work with you to arrange for make-up assignments. Note that missing more than 10% of a mini-session course makes it quite difficult to be successful.

Grade	**Expectations and characterization of achievement at that level**
A+	Fully and thoughtfully participates in all class activities and assignments, earning the top rubric scores for every assignment. Exceeds expectations by doing more than required (such as responding regularly to other's discussion board posts, doing extra entries in the data science dictionary).
A	Fully and thoughtfully participates in all class activities and assignments, earning top rubric scores for at least 90% of the assignments; completes every assignment.
A-	Fully and thoughtfully participates in all class activities and assignments, earning top rubric scores for at least 80% of the assignments; completes every assignment.
B+	Participates in all or nearly all class activities, earning top rubric scores for at least 70% of the assignments; completes almost every assignment.
B	Participates in all or nearly all class activities, earning top rubric scores for at least 60% of the assignments; completes almost every assignment.
B- or lower	A grade below B is a statement that the instructors do not believe that the teacher-participant made a reasonable effort to use the opportunity provided by this course. Evidence may include one or more of the following traits: lack of engagement in completing assignments, failure to take advantage of opportunities to revise assignments. Note that grades of B- and below may not count toward a master's degree at UNL.

Day	**Topic**
6-7-21	Exploring systems & networks
6-8-21	Habits of system thinkers; modeling networks
6-9-21	Habits of system thinkers; intro to graph theory
6-10-21	Tools of system thinkers; modeling information diffusion
6-11-21	Network science key ideas
6-14-21	Networks + communication; majority illusion
6-15-21	Supply chains; network collapse
6-16-21	Network science approach to COVID-19
6-17-21	Networks to model genealogy
6-18-21	Final presentations--learn from each other

Note: This class was offered via Zoom through the Center for Math, Science, and Computer Education (CMSCE) at the University of Nebraska. CMSCE recruited teachers and supported the class.