EPIDEMIOLOGY 730
SIMULATION MODELING OF TOBACCO USE, HEALTH EFFECTS AND POLICY IMPACTS
SUMMER TERM, 2021

Instructors:
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Classroom: TBD
Schedule: M-F 9:00am-noon, 1:00 pm-5:00pm

Description:

This course will introduce students to the use of simulation modeling to assess the burden of tobacco use on health, and project the impact of tobacco control interventions and regulations on use patterns and downstream health effects. The course will provide an overview of state transition and dynamical system models, their application in public health and policy making, and the use of simulation modeling in tobacco control. Students will learn about the main tobacco simulation models in the literature, become familiar with state transition and dynamical system models and develop and implement their own smoking simulation models in the R statistical software or Excel. The course will be a combination of lectures by leading experts in the field, modeling lectures, and hands-on lab sessions.

Prerequisite:

Either tobacco epidemiology or tobacco control knowledge, or familiarity with modeling. For those without modeling background, we recommend taking the *EPID 793 Complex Systems Modeling for Public Health Research* course first (offered the prior week). Students should have basic statistical or epidemiology knowledge.

Course Goals and Competencies:

By the end of this course, students should be able to:

1. Understand the applications of simulation modeling in tobacco control
2. Become familiar with the most established simulation models in tobacco control
3. Assess critically the tobacco simulation modeling literature
4. Implement basic smoking simulation models in R statistical software

Course Requirements and Grading:

The final grade will be based on the following:
- Class participation (40 % of course grade)
- Labs (60% of course grade)

Academic Integrity:

The faculty of the School of Public Health expect the conduct of a student registered or taking courses in the school to be consistent with that of a professional person. Courtesy, honesty, and respect should be shown by students toward faculty, guest lecturers, administrative support staff, and fellow students. Similarly, students should expect faculty to treat them fairly, showing respect for their ideas and opinions and striving to help them achieve maximum benefits from their experience in the school.

Student academic misconduct includes behavior involving plagiarism, cheating, fabrication, falsification of records or official documents, intentional misuse of equipment or materials, and aiding and abetting the perpetration of such acts. The preparation of reports, papers, and examinations, assigned on an individual basis, must represent each student's own effort. Reference sources should be indicated clearly. The use of assistance from other students or aids of any kind during a written examination, except when the use of books or notes has been approved by an instructor, is a violation of the standard of academic conduct.

Please visit https://sph.umich.edu/academics/policies-procedures/mph-mhsa.html and https://rackham.umich.edu/academic-policies/section8/ for the full SPH and Rackham Academic Integrity and further definition of these terms

Student Well-being:

SPH faculty and staff believe it is important to support the physical and emotional well-being of our students. If you have a physical or mental health issue that is affecting your performance or participation in any course, and/or if you need help connecting with University services, please contact the instructor or the Office of Academic Affairs.
Please visit https://sph.umich.edu/student-life/wellness.html for more information.

Student Accommodations:

Students should speak with their instructors before or during the first week of classes regarding any special needs. Students can also visit the Office of Academic Affairs for assistance in coordinating communications around accommodations.

Students seeking academic accommodations should register with Services for Students with Disabilities (SSD). SSD arranges reasonable and appropriate academic accommodations for students with disabilities. Please visit http://ssd.umich.edu/accommodations for more information on student accommodations.

Students who expect to miss classes, examinations, or other assignments as a consequence of their religious observance shall be provided with a reasonable alternative opportunity to complete such

academic responsibilities. It is the obligation of students to provide faculty with reasonable notice of the dates of religious holidays on which they will be absent. Please visit https://www.provost.umich.edu/calendar/religious_holidays19-20.html for the complete University policy.

Suggested Readings:

Simulation modeling appendix, Surgeon General's Report 2014.

Siebert U, Alagoz O, Bayoumi AM, Jahn B, Owens DK, Cohen DJ, Kuntz KM. State-Transition Modeling: A Report of the ISPOR-SMDM Modeling Good Research Practices Task Force-3. Med Decis Making. 2012; 32(5):690-700.

Mendez D, Warner KE, Courant PN. Has smoking cessation ceased? Expected trends in the prevalence of smoking in the United States. Am J Epidemiol. 1998;148(3):249-58.

Warner KE, Mendez D, Smith DG. Technical appendix to accompany: The financial implications of coverage of smoking cessation treatment by managed care organizations. 2004;41(1):57-69

Levy DT, Almeida LM, Szklo A. The Brazil SimSmoke Policy Simulation Model: The Effect of Strong Tobacco Control Policies on Smoking Prevalence and Smoking-Attributable Deaths in a Middle Income Nation. PLoS Med. 2012;9(11):e1001336.

Levy DT, Meza R, Zhang Y, Holford TR. Gauging the Effect of U.S. Tobacco Control Policies From 1965 Through 2014 Using SimSmoke. Am J Prev Med. 2016;50(4):535-542.

Cherng ST, Tam J, Christine PJ, Meza R. Modeling the Effects of E-Cigarettes on Smoking Behavior: Implications for Future Adult Smoking Prevalence. Epidemiology. 2016; 27(6):819-26.

Levy DT, Borland R, Lindblom E, Goniewicz M, Meza R, Holford TR, Yuan Z, Luo Z, O'Connor R, Niaura R, Abrams D. Potential Deaths Averted in USA by Replacing Cigarettes with E-Cigarettes. Tob Control. 2018; 27(1):18-25.

Warner KE, Mendez D. E:cigarettes: Comparing the possible risks of increasing smoking initiation with the potential benefits of increasing smoking cessation. Nicotine Tob Res. 2019;21(1):41-47.

Apelberg BJ, Feirman SP, Salazar E, et al. Potential public health effects of reducing nicotine levels in cigarettes in the United States. N Engl J Med. 2018;378(18):1725–1733.

Paddock SM, Kilmer B, Caulkins JP, Booth MJ, Pacula RL. An Epidemiological Model for Examining Marijuana Use over the Life Course. Epidemiol Res Int. 2012; pii:520894. doi:10.1155/2012/520894.

Caulkins JP, Dietze P, Ritter A. Dynamic compartmental model of trends in Australian drug use. Health Care Manag Sci. 2007;10(2):151-62.

EPID 730: Schedule

** This schedule is subject to change*

Day	Topic	Readings
1	• State transition models • Tobacco simulation modeling • Examples and applications • Lab 1. Healthy-Disease Model	• Simulation modeling appendix, Surgeon General's Report 2014 • Siebert et al. Med Decis Making. 2012; 32(5):690-700.
2	• The Mendez-Warner smoking simulation model • Lab 2. Developing a smoking simulation model. Part I, pseudo-algorithm and preliminary code	• Mendez D, Warner KE, Courant PN. Am J Epidemiol. 1998;148(3):249-58. • Warner KE, Mendez D, Smith DG. 2004;41(1):57-69.
3	• The SimSmoke simulation model • Modeling policies • Lab 3. Developing a smoking simulation model. Part II, coding the model	• Levy DT, Almeida LM, Szklo A. PLoS Med. 2012; 9(11):e1001336 • Levy DT, Meza R, Zhang Y, Holford TR. Am J Prev Med. 2016;50(4):535-542.
4	• Modeling E-cigarettes and other tobacco products • Lab 4. Assessing the impact of policies targeting smoking cessation or initiation	• Cherng ST, Tam J, Christine PJ, Meza R. Epidemiology. 2016; 27(6):819-26. • Levy DT, Borland R, Lindblom E, et al. Tob Control. 2018; 27(1):18-25. • Warner KE, Mendez D. Nicotine Tob Res. 2019;21(1):41-47.
5	• Advanced topics. Modeling heterogeneity (disparities). Modeling of other addictive behaviors, e.g., marijuana use. (Guest speakers)	• Apelberg BJ, Feirman SP, Salazar E, et al. N Engl J Med. 2018;378(18):1725–1733. • Paddock SM, Kilmer B, Caulkins JP, et al. Epidemiol Res Int. 2012; pii:520894. • Caulkins JP, Dietze P, Ritter A. Health Care Manag Sci. 2007;10(2):151-62.