DEPARTMENT OF CITY AND REGIONAL PLANNING

University of North Carolina at Chapel Hill

PLAN 756: Survey of Natural Hazards and Disasters **Fall 2017**

Instructor: Gavin Smith, Research Professor, Department of City and Regional Planning; Director, Department of Homeland Security-Coastal Resilience Center of Excellence; Senior Recovery Advisor Hurricane Matthew-State of North Carolina.

Guest Speakers: A number of class lectures are provided by invited speakers drawn from government, private sector, non-profit and academic fields.

Office: New East, Room 302
Office Hours: Wednesday 3:30-4:30 or by appointment
Class Location: New East 102
Class Time: Wednesday 5:15-8:00

Course Overview

This survey course provides a graduate level introduction to the broad fields of study associated with natural hazards and disasters. Emphasis is placed on gaining an understanding of the defining characteristics of natural hazards and how their effects on human settlements can lead to a series of issues that help us understand what defines a disaster. This course introduces students to a range of topics including meteorology, geology, hydrology, engineering and building performance, policy making, planning, and sociology, among other disciplines.

Given the introductory nature of the course material, no class prerequisites are required other than a student must be enrolled in a graduate program at the University of North Carolina at Chapel Hill, North Carolina State University or Duke University. Undergraduate students can petition to take the class subject to the instructor's approval and availability of remaining seats.

The course is framed using concepts of sustainable development and disaster resilience, including those pre- and post-disaster conditions and actions that enhance or hinder these aims. Emphasis is placed on the use of case studies of past disasters to help students understand the physical characteristics of natural hazards and how they led to the disaster in question.

The course is also intended to explain how planning plays an important role in the larger issue of natural hazards risk management, including our ability to adapt to a changing climate and create more sustainable, disaster resilient communities.

Course Objectives

1) To identify and explore key defining meteorological, geologic, hydrologic, characteristics of natural hazards, as well as the effects of a natural hazards intensity, duration, speed of onset, and extent/geographic distribution.

2) To identify and explore the key defining characteristics of pre- and post-event conditions that differentially predispose some people, organizations, communities, regions, states, and nations to disasters, including human settlement patterns, federal state and local policy choices, and decisions made by various organizations, institutions, and individuals;

3) To identify and explore pre- and post-disaster actions and their effects, including the perpetuation or reduction of vulnerability in areas impacted by extreme events, the hindering or fostering of equity, the impacts on economic development, and the role of the environment in disaster management;

4) To explore the relationship between sustainability, disaster resilience, and climate change adaptation; and

5) To identify and assess different types of natural hazards risk management governance frameworks, and propose new ways to improve them based on class readings, discussions, and case study review and analysis.

Course Format

This course will meet once per week. Class sessions include lectures (emphasizing applicable cases selected from across the United States and abroad) and discussion, oral presentations, and the review of disaster case studies by students. Invited speakers include nationally and internationally recognized scholars and practitioners in the field of natural hazards risk management and climate change adaptation. It is expected that students will come to each class prepared to actively participate in discussions led by the instructor, invited speakers, and students; lead class discussions as assigned; and present materials as part of individual and group projects. Students are expected to work on individual and group projects outside of class.

Student Evaluation

Case studies (presentations):	1/3 of total grade
Term paper (abstract and final paper):	1/3 of total grade
Class participation (general class discussion):	1/3 of total grade

Note: Term papers are due the last day of class.

Assignments/Expectations

1) Read required assignments and participate in class discussions, including those led by instructor, guest speakers, and students.
2) Lead class discussion as assigned; present case study findings to class.
3) Attend and participate in one or more field trips. Observations, including those germane to class readings and lectures will be discussed in the following class and should be used in student presentations and papers when appropriate.
4) Write a term paper not to exceed 10 pages in length (single spaced). The paper should address a topic that is relevant to the class. Students will write a 1-page abstract describing the intent of the paper and discuss with the instructor as part of the assignment.

Reading List

The reading list contains a set of readings which students are required to read before class and be able to discuss them during the relevant session. Required reading materials, with the exception of the course textbook will be available in digital format in the course folder. Additional readings not noted in the syllabus may be required by guest instructors.

Textbook:

Rubin, B. Claire. 2012. Emergency Management: The American Experience 1900-2010. Second Edition. Boca Raton, Florida: CRC Press.

Course Outline: Topical Areas, Reading List, Speakers, Field Trips, and Assignments

Session 1 Introduction (August 23). Course introduction, including case study approach used in class as well as an overview of course material, format, and expectations; Introduction to natural hazards and disasters; the concepts of sustainability and resilience; and the science, policy, and practice of natural hazards and disasters. Personal experiences with disaster?

Readings:

Perry, Ronald W. What is a Disaster? 2005. Chapter 1, pp. 1-15. In Handbook of Disaster Research. Eds. Rodriguez, Havidan, Enrico Quarantelli and Russell R. Dynes. New York: Springer.

Rubin, Claire. 2012. Chapter 1, Introduction: 110 Years of Disaster Response and Emergency Management in the United States. Pp. 1-12. In Emergency Management: The American Experience 1900-2012. Claire B. Rubin, Ed. Second Edition. Boca Raton, Florida: CRC Press.

Tampa Bay's Coming Storm. Darryl Fears. Washington Post. July 28, 2017. https://www.washingtonpost.com/graphics/2017/health/environment/tampa-bay-climate-change/?tid=ss_mail&utm_term=.50c05c1220e1

Natural Hazards and Disasters: Research and Practice

Session 2 (August 30). Understanding Natural Hazards and Disasters. Defining natural hazards and disasters, including hazard characteristics (extent/spatial distribution, speed of onset/warning, duration, magnitude/intensity), risk, exposure, and vulnerability; understanding the effects of modifying the environment and human settlements in and adjacent to hazardous areas. How can hazards analysis better account for social vulnerability?

Readings:

Butler, David. 2012. Chapter 2, Focusing Events in the Early Twentieth Century: A Hurricane, Two Earthquakes, and a Pandemic. Pp. 13-50. In Emergency Management: The American Experience 1900-2010. Second Edition. Claire B. Rubin, Ed. Boca Raton, Florida: CRC Press.

Cutter, Susan L., Brian Boruff, W. Lynn Shirley. Social Vulnerability to Environmental Hazards. Social Science Quarterly, Vol. 84, Issue 2, 242-261. May 2003.

Pine, John. 2015. Chapter 1, Introduction to Hazards Analysis. Pp. 1-28. In Hazards Analysis: Reducing the Impact of Disasters. Second Edition. Boca Raton, Florida: CRC Press.

Session 3 (September 6). Natural Hazards Risk Management Policy and Practice. Discussion of the effects of federal, state, and local policies and planning; description of the history of emergency management as practiced in the United States and abroad, including international lessons; discussion of the four phases of emergency management (preparedness, response, hazard mitigation and disaster recovery).

Guest Speaker:

Libby Turner (confirmed), Federal Coordinating Officer, Federal Emergency Management Agency. Libby will discuss the role of the Federal Coordinating Officer to include describing her work experiences in the Joplin Tornado, Hurricane Matthew and past disasters. This will be followed by a general class discussion. Libby will also comment on student presentations addressing 1) the Stafford Act / Disaster Mitigation Act and 2) the Post-Katrina Emergency Management Reform Act / Sandy Recovery Improvement Act.

Readings:

Gerber, Brian J. Disaster Management in the United States: Examining Key Political and Policy Challenges. The Policy Studies Journal, Vol. 35, No. 2: 227-238.

Tierney, Kathleen. Disaster Governance: Social, Political, and Economic Dimensions. Annual Review of Environment and Resources. 2012, Vol. 37:341-363.

Sylves, Richard. Federal Emergency Management Comes of Age: 1979-2001. Pp. 115-166. In Chapter 5 Federal Emergency Management Comes of Age. 1979-2001. Emergency Management: The American Experience 1900-2012. Claire B. Rubin, Ed. Second Edition. Boca Raton, Florida: CRC Press.

Students may choose from the following disaster management policies:

1) Robert T. Stafford Disaster Relief and Emergency Assistance Act and the Disaster Mitigation Act of 2000 (Colleen)
2) Post-Katrina Emergency Management Reform Act and Sandy Disaster Recovery Act (Darien)

Presentations (not to exceed 10 minutes) will address the following: a) a general overview of the legislation's intent, b) a brief historical context as to why the legislation was passed (e.g., precipitated by a specific event or other factors), c) an assessment of how well the legislation has met its original intent; d) the degree to which the legislation facilitates or hinders sustainability and disaster resilience; and d) proposed improvements based on class readings, discussions, and your own research. Presentations should include class readings and materials as appropriate.

Session 4 (September 13, 1-3pm) (Tentatively scheduled with Joe Wright). Field Trip to EOC. North Carolina Division of Emergency Management. Raleigh, North Carolina.

Students will tour the North Carolina Division of Emergency Management's Emergency Operations Center where the Director, Deputy Director and Section Chiefs will discuss the activities and responsibilities of the state agency to include response, preparedness, hazard mitigation, and disaster recovery. Students should be prepared to ask specific questions of state emergency management professionals based on assigned class readings to include national policies discussed in the previous class and how operations may have changed after 9-11 and Hurricane Katrina.

Readings:

Harrald, John R. Emergency Management Restructured: Intended and Unintended Outcomes of Actions Taken Since 9/11. Pp. 167-190. In Emergency Management: The American Experience 1900-2012. Claire B. Rubin, Ed. Second Edition. Boca Raton, Florida: CRC Press.

Gall, Melanie and Susan L. Cutter. 2005 Events and Outcomes: Hurricane Katrina and Beyond. Pp. 191-212. In Emergency Management: The American Experience 1900-2012. Claire B. Rubin, Ed. Second Edition. Boca Raton, Florida: CRC Press.

Session 5 (September 20). Engineering, Natural Hazards, and Disasters

Discussion will include the role of engineering in natural hazards risk management, including the value of tools used by engineers as well as how an emphasis on engineering approaches can lead to increased threats to people and property. Dr. Galloway will also discuss the need to move beyond the concept of stationarity as a means to assess risk based on a retrospective analysis of past extreme weather events in an era of climate change.

Speaker: Gerry Galloway (confirmed), Glenn L. Martin Institute Professor of Engineering, University of Maryland.

Readings:

Sharing the Challenge: Floodplain Management into the 21st Century. Report of the Interagency Floodplain Management Review Committee to the Administration Floodplain Management Task Force. June 1994. Washington, D.C. (Read Executive Summary, skim remainder of document).

Session 6 (September 27). Speaker Panel-Law, Natural Hazards and Climate Change Adaptation. Speakers: Don Hornstein, Aubrey L. Brooks Professor of Law. UNC Law School (Flood Insurance, Law and Hazards-Confirmed); **Norma Houston**, Adjunct Professor of Law, UNC Law School, UNC School of Government (Emergency Management Law-Confirmed); **Sam Medlock,** Former White House Policy Counsel on Climate Change Adaptation (Law in Hazard Mitigation and Climate Change Adaptation-Confirmed). Joint panel co-hosted with the UNC Law School.

Readings:

White, Dale and Dinah Voyles Pulver. 2017. Gambling with Mother Nature: Climate change brings new risks for homeowners, insurers. GateHouse Media. http://gatehouseprojects.com/risingseas/property-insurance/

Kunreuther, H. 1996. Mitigating Disaster Losses through Insurance. Journal of Risk and Uncertainty. 12:171-187.

Thomas, Edward A. and Sam Riley Medlock. 2008. Mitigating Misery: Land Use and Protection of Property Rights Before the Next Big Flood. Vermont Journal of Environmental Law. Vol. 9, No. 155: 155-188.

Overview of Natural Hazards and Disaster Case Study Reviews

The remainder of the course will focus on the analysis of natural hazards and disasters using a series of historic cases of major disasters that have occurred in the United States and abroad.

Session 7 (October 4). Meteorological Events: Flooding and US Flood Policy. Discussion of the National Flood Insurance Program; riverine and coastal flooding, including an analysis of key flood-related disaster case studies. Instructor will discuss the NFIP as well as Tulsa, Oklahoma, Lyons Colorado, and Vermont flood events. 2014 Colorado flood video will be shown in class www.coloradounited.com.

Speaker/Invited Guest: none.

Students may choose from the following disaster case studies:

1) Mississippi River Floods (1927 and 1993)
2) Hurricane Floyd (1999)

Readings:

Rumbach, Andrew, Carrie Makarewicz, Jeremny Nemeth, and Deborah Thomas. Understanding Household Recovery Following the Colorado Flash Floods (2013). Quick Response Grant Report series; 250. 2014. *https://hazards.colorado.edu/quickreport/understanding-household-recovery- following-the-colorado-flash-floods-2013*

NOTE: Paper abstract due.

Session 8 (October 11). Meteorological Events: Hurricanes, Coastal Storms and Nor'easters. Discussion of hurricanes, coastal storms, and Nor'easters, including an in-depth analysis of key disaster case studies. Focus will be placed on coastal flooding, high winds and storm surge and their effects on human settlements and ecosystems.

Speaker: Jay Barnes (confirmed), author of North Carolina's Hurricane History.

Hurricane

Students may choose from the following disaster case studies:

1) Hurricane Andrew (1991)
2) Hurricane Katrina (2005)
3) Hurricane Sandy (2012)

October 18 – NO CLASS Fall Break

Session 9 (October 25). Hurricane Matthew Disaster Recovery and Resilience Initiative (HMDRRI).

Speakers: Barry Hokanson and Link Walther, Land Use Planners and Disaster Recovery Experts. Barry and Link, who are land use planners with more than 40 years of experience in local land use planning, including planning for post-disaster recovery, are leading student teams created to assist six hard-hit, low capacity communities recover from Hurricane Matthew.

Barry Hokanson and Link Walther will provide overview of the Hurricane Matthew Recovery and Resilience Initiative. **Note: Professor will not be in class.**

Session 9 (November 1). Field Trip. (HMDRRI communities), North Carolina.

If possible (depending on student schedules and availability), students will tour one or more of the six HMDRRI communities. Students that have participated in the HMDRRI and are students in this class will assist the instructor lead the tour.

Speaker: Local officials in the communities we tour.

Readings:

Riggs, Stanley R. 2001. Anatomy of a Flood, pp. 29-45. In Facing our Future: Hurricane Floyd and Recovery in the Coastal Plain. Eds. John R. Maiolo, John C. Whitehead, Monica McGee, Laurinston King, Jeffrey Johnson, Harold Stone. Greenvile, North Carolina: Coastal Carolina Press.

Session 10 (November 8). Meteorological Events: Drought, Extreme Heat, and Wildfire.
Discussion of Drought, Extreme Heat, and Wildfire, including an in-depth analysis of key disaster case studies.

Heat Wave

Students may choose from the following disaster case studies:

1) Chicago, Illinois Heat Wave (1995)
2) European Heat Wave (2003)

Readings:

Klinenberg, Eric. 2002. Heat Wave: A Social Autopsy of Disaster in Chicago. Chicago: University of Chicago Press. Chapter 1. The Social Production of Isolation. Pp. 37-78.

Drought

Students may choose from the following disaster case study:

1) Drought (1930's Dust Bowl)

Wildfire

Students may choose from the following disaster case study:

1) Oakland, California Wildfire (1991)
2) Australian "Black Saturday" Bushfire (2009)

Readings:

Wildfire Case Study: Oakland. California. 1998. Kenneth Topping, pp. 261-277. In Planning for Post-Disaster Recovery and Reconstruction. Chicago: American Planning Association.

Session 11 (November 15). Meteorological Events: Tornadoes and Winter Storms.

Discussion of tornadoes and winter storms, including an in-depth analysis of key disaster case studies.

Tornadoes

Students may choose from the following disaster case studies:

1) Xenia, Ohio Tornado (1974)
2) Greensburg Tornado (2007)
3) Joplin, Missouri Tornado (2011)
4) Winter Storm – Atlanta

Readings:

White, Stacy Swearingen. 2010. Out of the Rubble and Towards a Sustainable Future: The "Greening" of Greensburg, Kansas. Sustainability, 2: 2309-2319.

NO CLASS – November 22 – Thanksgiving Break

Session 12 (November 29). Geotechnical Events: Volcanoes, Earthquakes and Tsunami.

Students may choose from the following disaster case studies:

Volcanoes

1) Mount Saint Helens (1980)
2) Krakatoa (1883)

Readings:

Tilling, Robert I. Volcanic Hazards and their Mitigation: Progress and Problems. May 1989. Reviews of Geophysics. Vol. 27, Issue 2, 237-269.

Cooper, George and Gavan Daws. 1985. Hawaii: Subdividing Lava Fields (pp. 259-277), In Land and Power in Hawaii: The Democratic Years. Honolulu, Hawaii: Benchmark Books.

Earthquakes

Students may choose from the following disaster case studies:

1) Charleston Earthquake (1886)
2) Haiti Earthquake (2010)
3) Darfield/Canterbury, New Zealand Earthquake (2010)

Readings:

B. C. Glavovic, W. S. A. Saunders, J. S. Becker. 2010. Land-use Planning for Natural Hazards in New Zealand: The Setting, Barriers, 'Burning Issues' and Priority Actions. Natural Hazards. 54: 679–706.

Tsunami

Students may choose from the following disaster case studies:

1) Hilo, Hawaii Tsunami (1960)
2) 2004 Indian Ocean Tsunami
3) Tohoku, Japan Earthquake and Tsunami (2011)

Readings:

Shaw, Rajib. Indian Ocean Tsunami and Aftermath: Need for Environment-Disaster Synergy in the Reconstruction Process. 2006. Disaster Prevention and Management, 15(1): 5 – 20.

Students may choose from the following disaster case studies (landslides):

1) Mameyes, Puerto Rico (1985)
2) Oso, Washington (2014)
3) Sierra Leone Landslide (2017)

Readings:

Schwab, James C., Paula L. Gori and Sanjay Jeer. Landslide Hazards and Planning. Planning Advisory Services Report Number 533/534. Chicago. American Planning Association. Chapter 1: A Primer on Landslide Hazards for Planners, pp. 1-15.

Session 13 (December 6). Slow-onset Events: Subsidence, Erosion, and Sea Level Rise. Policy Learning: Are we Really Learning? Class Wrap up.

Speaker: Bill Hooke (invited) is Associate Executive Director of the American Meteorological Society, based in Washington, DC. Dr Hooke is the author of the AMS blog, Living on the Real World (blog), as well as the AMS book of the same name, Living on the Real World (book). His policy research interests include: natural disaster reduction; historical precedents as they illuminate present-day policy; and the nature and implications of changing national requirements for weather and climate science and services. Dr Hooke holds a BS degree in physics (honors, 1964) from Swarthmore College, and SM and PhD degrees (1966, 1967) from the University of Chicago. He is a member of the American Philosophical Society. He chairs the NAS/NRC Disasters Roundtable, and serves on the International Council for Science Planning Group on Natural and Human-Induced Environmental Hazards and Disasters.

Dr. Hooke will discuss his thoughts on why we seem to not learn from past disasters and ways to alter the current paradigm. His presentation will help to frame our last class discussion which is focused on needed policy improvements. Students are expected to be prepared to discuss their recommended changes based on the case studies presented this semester as well as class readings. Bill will also provide feedback on student presentations.

Readings: None

Students may choose from the following disaster case study (erosion):

1) Coastal Erosion (North Carolina Barrier Islands)

Students may choose from the following disaster case study (subsidence):

1) Coastal Louisiana

Discussion of the changing face of natural hazards and disasters in the era of climate change. Emphasis will be placed on an in-depth analysis of sea level rise and exacerbated natural hazard vulnerability. Lecture and class discussion will address concepts discussed throughout class and how climate change affects them.

Instructions for Class Assignments

Case Study Review and Analysis:

Presentations: Individuals or student teams will review and analyze disaster cases as assigned. Individuals or student teams will present their findings (in a PowerPoint) to the class, invited guests, and instructors. The presentations (not to exceed 20 minutes) will include the following elements:

1) Historical overview of the hazard event (e.g. extent, duration, speed of onset, magnitude);
2) The effect of human settlements on pre-event vulnerability, including the degree to which the disaster differentially affected populations and groups;
3) Description of preparedness, hazard mitigation, response, and recovery activities prior to during and following the disaster being studied;
4) Specific recommendations to improve observed policies, programs, and actions of identified stakeholders.

Individuals and will be provided feedback from invited hazards scholars and practitioners who may have been involved in the extreme event in question or considered an expert in the topical area presented.

Term Paper: Students are required to write a term paper (not to exceed 10 pages in length-single spaced). It is expected that papers present a clearly articulated issue/problem linked to the existing literature followed by your own observations about the topical area and a set of well-crafted policy recommendations intended to address the problems identified. The paper should include the following sections: 1) an introduction to your chosen topic, including why it is important/significant; 2) a review of the literature; 3) a discussion of your observations/findings; 4) policy recommendations addressing identified issues/problems; 5) conclusion; and 6) references.