

## GEO 3341 EXTREME FLOODS

SPRING 2020

T | Period 6 - 7 (12:50 PM - 2:45 PM) in TUR 3012

R | Period 6 (12:50 PM - 1:40 PM) in TUR 3012

**Instructor:** Dr. Joann Mossa

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**Office Location:** 3129 Turlington

**Office Hours:** TR 11:30 - 12:30 or by apt.

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**CATALOG DESCRIPTION:** Examines the world's most extreme floods from the Pleistocene through present due to various causes. Discusses physical and human aspects of flood warning, preparedness, response and recovery throughout the world. **(GE-PN)**

### COURSE OBJECTIVES INCLUDE:

- *Understanding of the causes of floods* including excessive precipitation, excessive snowmelt, climatic oscillations, tsunamis, coastal storm surges, glacial lake outburst floods (GLOFs), ice jams, landslides, natural dam failures and other physical processes. Floods are also caused or augmented by failures, overtopping, mismanagement or intentional destruction of constructed dams and artificial levees and floodwalls.
- *Examining methods for assessing paleofloods*, paleoclimate and historical change with PSI-SWD-(paleostage indicators slack water deposits) and varied geologic and chronologic techniques (radiocarbon dating, tephrochronology, dendrochronology, lichenometry, stratigraphic methods), remote sensing for interpreting landscapes and change; Use of GIS and GPS for flood response, recovery and mitigation including search and rescue, flood frequency analysis, hydrologic modeling, and floodplain mapping
- Knowing that *values, attitudes and norms of different cultures and nationalities affect flood decisions and responses*. Extreme floods are influenced by settlement choices, land use change, governmental behaviors, and public education about disasters. *Individuals of different nationality, age, culture, gender, race, and income may be disproportionately and differentially affected by floods* in terms of lives, homelessness, displacement, and property damage due to variations in vulnerability and resilience in differing parts of the world.
- Examining *problems beyond direct inundation* including the erosion done by water, the debris brought in by water, ensuing famines, the spread of disease due to poor drinking water, disrupted sanitation facilities, inadequate and dysfunctional medical care, contamination of water (sewage, dam failures at mines), etc.
- Considering *varied outcomes of floods and lessons learned*. Discussing how floods have influenced history, culture, art, music, historic preservation, race relations, migration patterns, crime and crime-control attempts, mental health, seismology, animals, agriculture, livelihoods, engineering, policy, relief efforts, fund raising, tourism and more. Some stories regarding public education, advertising, memorializing, policy, government conflicts, and engineering.

### DISCLAIMER/WARNING

Please use your judgment as to whether the content of this course is suitable given your history and background, especially if you have experienced trauma or distress due to a disaster. We view some documentaries and witness accounts of recent floods that are sad or disturbing.

## GRADING SCALE

A = 92 or above; A- = 90-91.9; B+ = 88-89.9; B = 82-87.9; B- = 80-81.9; C+ = 78-79.9; C = 70-77.9; C- = 68-69.9; D+ = 66-67.9; D = 60-65.9; D- = 58-59.9; E = < 58

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

## NO CLASSES:

Spring Break

Early April...AAG meetings

Other cancellations will be announced in class

## BASIC TEACHING APPROACH

- Want to create a positive learning environment
- Some readings, posted on Canvas (no \$ out of pocket for books)
- Content and teaching style appeals most to visual and kinesthetic/experiential learners
- Big believer in resource availability, all Power Points posted on Canvas; Use them
- I ask open-ended questions in class to help in retention, learning and thinking
- Bring your questions to assist in understanding and recollection
- Attendance, responsible behavior and engagement encouraged by in-class work
- Some in-class discussion after shorter videos
- Some Canvas discussion, posting, thinking
- Many items graded (more than 15). You will not be anonymous.
- *If you tend to miss classes, want to be anonymous, or prefer exams to assignments, consider dropping this class in favor of one more suited to your learning style*

## ASSIGNMENTS, ATTENDANCE AND MAKE-UP POLICY

Class attendance is critical. Please obtain valid written documentation if you miss in-class assignments and exams.

### *Grade Breakdown Summary*

Assignment Type	Points or percentage
Mini-assignments In class: Video sheets, 20 pts. Take-home: crossword puzzles, discussion comments in Canvas, 10-30pts. Longer take-home: 30-50 pts	~50%
Open Book Quizzes in Canvas	~30%
Mini-Exam/Big Quiz 1	~10% (25 questions, MC)
Mini-Exam/Big Quiz 2	~10% (25 questions, MC)
Total	100%

**MINI (MOSTLY IN-CLASS) ASSIGNMENTS (~50%):** One type of in-class assignment will be answering questions about documentaries or videos of floods associated with a variety of causes. Soon after class begins, the door will be closed as to not have distractions during the movie, so it is important to be on time. These answer sheets will be turned in at the end of class. After they are returned, keep these to help with your exam review. Remaining assignments will include participation in Canvas discussions and in-class small group work, and short take-home assignments designed to assist in learning terminology, thinking skills, concepts and questioning

**OPEN BOOK QUIZZES IN CANVAS (~30%):** Quizzes usually to be submitted on Sundays following introduction of class content.

**BACKGROUND AND PLEISTOCENE EXAM (~10%):** The exam will consist of multiple-choice questions. A review will be held the class before with some sample questions. It will be given after these units are completed, 25-question multiple choice (100 pts.) Tentatively review on February 18 and Exam on Feb 20th

**EXAM 2: MODERN FLOODS (~10%):** Late November. A fun review will be held the class meeting before on April 14 with some sample questions. Not comprehensive, 25 question multiple choice (100 pts.), tentatively April 16.

### **GENERAL OUTLINE: COURSE TOPICS**

#### **Weeks 1, 2 and 3: Background and Overview**

- Introduction to Class and Class Environment
- Background to rivers/coasts/floods via Mossa biography
- Physical Causes of Floods:
  - What is a flood? How are they measured?
  - What are some important floods in the geologic past and their effects?
  - How do we know about their magnitude, causes and dates?
  - What are the physical causes of extreme floods?
- Floods and Society:
  - How do humans affect floods?
  - What are some important historical floods and their impacts?
  - How can humans best manage floods and other disasters?
  - Who is most affected by extreme floods?
- Discovery Channel Flood **movie** (global coverage)

#### **READINGS**

- O'Connor, Jim E. and John E. Costa, 2004, The World's Largest Floods, Past and Present: Their Causes and Magnitudes, U.S. Department of the Interior, U.S. Geological Survey Circular 1254 (pdf file on Canvas)
- O'Connor, Jim E. and John E. Costa, 2003, Large Floods in the United States: Where They Happen and Why. , U.S. Department of the Interior, U.S. Geological Survey Circular 1245 (pdf file on Canvas).

**Weekly topics...may change slightly or be reduced**

### **Weeks 3, 4 and 5: Some Pleistocene Megafloods**

- Discussion of the Pleistocene and climate change
- Glacial Lake Missoula; dry falls, megaripples: Mystery of Megaflood **movie**
- Lake Bonneville and its lake basin overflow floods
- Megafloods making island Britain through the English channel

### **Weeks 6 and 7: Some Megafloods of the Holocene to the Modern (1800 A.D.)**

- Aniakchak, Alaska caldera breach 3500 BP (appx. 2000 BC)
- Repeat floods in the Netherlands dating back more than 2 millenia
- Columbia River Landslide dam failure, circa 1450 AD or 1700 AD?
- Possibly linked to 1700 tsunami Japan
- 1755 - Lisbon, Portugal tsunami (earthquake & fires, too), birth of seismology compared to Japan 2011 tsunami & nuclear disaster

### **Review and Exam 1: Overview, Pleistocene and Holocene floods**

Target Date: late February (tentative Thursday February 20)

### **Weeks 8, 9 and 10: Modern Megafloods of Marine, Lacustrine or Mixed Origin**

- Vulnerable places with multiple flood drivers
  - Venice, Italy: a sinking city with sea level rise, Venice **movie**
  - New Orleans: the soup-bowl, Hurricane Katrina 2005 and NOVA **movie**
  - Bangladesh a country of poverty, bank erosion, and floods
  - Contrast of vulnerable nations worldwide and the role of social factors
- Tsunamis, Coastal Storm Surges, and Lowland Lake Floods
  - The Okeechobee Florida Hurricane of 1928, race & memorials
  - The Great Hurricane of 1938, NE U.S., American Experience **movie**
  - North Sea, Europe 1953 winter storm flood
  - Lituya Bay, Alaska megatsunami, 1958: a > 500m landslide splash
  - Indian Ocean 2004 tsunami and NOVA **movie**: A worldwide killer
- Comparative discussion of how different countries facing the Indian, Pacific and Atlantic Oceans have responded differently to tsunamis and cyclones based on cultural differences and global inequality in a variety of factors

### **Weeks 11, 12 and 13: Some Modern Megafloods along Rivers**

- Big Rivers-Big Floods
  - Mississippi Flood of 1927: mass migration, Frontline **movie**
  - Yellow River (*Huang He*) floods: Lindbergh & 1-4 million dead
  - Yangtze River floods in 1998 and more: 14 million homeless
  - Comparing how differing nations plan for and respond to floods on big rivers: issues include global inequality, illiteracy, cultural adaptation, governmental suppression, land availability, disease and more
- Catastrophic Dam Failures/Overtopping/Mismanagement
  - Johnstown Flood 1889, the Red Cross effort and Johnston flood
  - Malpasset France in 1959, arch dam safety, disaster tourism **movie**
  - Vaiont disaster, Italy 1963, landslide overtopping-know geology **video**
  - Florence, 1966; Flooded works=mud angels and historic preservation
  - An international view of dam failures, varied local reactions and global effects

- Catastrophic Levee and Floodwall Failures
  - Red River (ND, MN, Canada) flood from snowmelt, 1997 and more
- Intentional Floods
  - Blowing up dams and dikes in wartime (By allied forces in Germany, by Germans in Netherlands, by Chinese in China)
  - Dynamiting levees: flooding rural areas to save cities (China, U.S)
  - Dam-building/flooding >1 million people, Yangtze-Three Gorges, 2000-
  - Comparing perspectives of differing nations on intentional floods, especially from dam building and forced displacement of its citizens

**Topical power point or Flood Game due early November**

Note: I highly recommend that you run your topic by me & begin it early

**Week 14: “What If” Floods: Might Have Been/Might Become**

- Might Have Been a Megaflood
  - Mississippi-Atchafalaya 1973 (McPhee.The Control of Nature)
  - China and averting floods from earthquake landslide lakes 2008
- Might Become a Megaflood
  - Usoi Dam/Sarez Lake, Murghab River, Tajikistan, 1911 and holding
  - Three Gorges dam (Yangtze, China) landslides and seismic activity
- Comparing how different nations and cultures are (not) preparing for what-if floods

**Reviewing and Exam 2**

Target Date: Thursday April 16

**Week 15: Speculation, The Future of Flooding**

- Flood warning and preparedness: How has it changed and can it be improved?
- Flood response and recovery: How has it changed and can it be improved?
- Flood insurance/FEMA: **videos**
- Floodplain management: Where are we and others?
- Floods: climate change, sea level rise, land use change and settlement trends

**HONOR CODE:** UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code.” On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor of this class.

**STUDENTS WITH DISABILITIES AND OTHER CONCERNS** "Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. Please take care of your health and be aware that the University Counseling Center (<http://www.counseling.ufl.edu/cwc/Default.aspx>, 392-1575), the Student Health Care Center (392-1161) and Student Mental Health (392-1171) can assist students as they work through personal, academic and social issues. Provide advance notice and obtain documentation for excused absences where possible. If needed, University Police Department can be contacted at 392-1111 or Dial 9-1-1 for emergencies.

**COMMON SENSE ADULT BEHAVIOR** Please minimize distractions to yourself and others during class time (cell phones used only when part of classwork, no ancillary conversations, quiet typing only).

**GETTING HELP IN CANVAS:** For issues with technical difficulties for Canvas, please contact the UF Help Desk at: <http://helpdesk.ufl.edu>; (352) 392-HELP (4357); Walk-in: HUB 132  
Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from the Help Desk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you need to resubmit.

**EVALUATIONS:** Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.