



## MASTER COURSE OUTLINE

A. GEOG 1250 Introduction to Meteorology

B. COURSE DESCRIPTION:

This course serves as an introduction to understanding the basic concepts of meteorology and is designed for non-science majors. Students will explore the weather processes in-depth and its impact on society through relevant, historical, current, and scientifically important events. Atmospheric concepts are emphasized to equip students with skills and knowledge to explain a wide range of severe weather including tropical cyclones, midlatitude cyclones, thunderstorms, tornadoes, hail, lightning, flooding, and snowstorms. This course includes a lab component where students will use real-time and climatological data to analyze, predict, and mitigate severe weather events. Prerequisites: None.

**MnTC (Goal 3/NS and 10/PE); (4 Cr – 3 lect, 1 lab)**

C. \*Core Theme: People and the Environment \*\*Discipline Area (if MnTC): Natural Sciences and People and the Environment

D. RIVERLAND INSTITUTIONAL LEARNING OUTCOMES:

This course addresses the following Riverland Institutional Learning Outcome(s):

- ILO 1: critical thinking (*Core Theme Goal 2*)
- ILO 2: awareness of the larger global community (*Core Theme Goal 7 or 8*)
- ILO 3: ethical, engaged citizenship (*Core Theme Goal 9 or Goal 10*)
- ILO 4: communication and collaboration (*Discipline Goal 1 and by any learning outcome(s) involving communication or collaboration*)

E. MAJOR CONTENT AREAS:

- The Atmosphere
- Thermodynamics and Solar Radiation
- Moisture and Precipitation
- Meteorological Measurements
- Weather Radar
- Atmospheric Forces and Wind
- Oceanic-Atmospheric Circulations
- Earth's Climates
- Air Masses and Fronts
- Midlatitude (Extratropical) Cyclones
- Tropical Cyclones
- Severe Local Storms: Thunderstorms, Tornadoes, Hail, and Lightning

- Weather Observations, Numerical Weather Prediction, and Hazard Mitigation

F. GOAL TYPE, OBJECTIVES, AND OUTCOMES:

<u>GOAL TYPE</u>	<u>OBJECTIVES</u> Students will be able to:	<u>OUTCOMES</u> The student will successfully:
<u>MnTC Goal 3a</u>	demonstrate understanding of scientific theories.	<ol style="list-style-type: none"> <li>1. explain the concept of stability, the impact of vertical and horizontal variations in temperature and solar radiation, and the role of moisture in severe weather development.</li> <li>2. explain atmospheric forces and multi-scale winds, the jet stream, and pressure systems.</li> <li>3. explain how clouds form and produce different types of precipitation.</li> <li>4. correlate thunderstorm evolution to resultant severe weather such as lightning and precipitation (flash flooding, hail, snowstorms).</li> </ol>
<u>MnTC Goal 3b</u>	formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.	<ol style="list-style-type: none"> <li>1. plot and interpret an atmospheric sounding; be able to summarize indices used in weather forecasting.</li> <li>2. demonstrate proficiency in visual identification of thunderstorm features and explain flow fields within a thunderstorm.</li> </ol>
<u>MnTC Goal 3c</u>	communicate their experimental findings, analyses, and interpretations both orally and in writing.	<ol style="list-style-type: none"> <li>1. employ weather radar knowledge to evaluate and communicate the risks and hazards of different types of severe weather.</li> <li>2. formulate and communicate location specific forecasts based on observations, meteorological measurements, and numerical weather prediction.</li> </ol>
<u>MnTC Goal 3d</u>	evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.	<ol style="list-style-type: none"> <li>1. evaluate the risk of natural hazards through a demonstrated understanding of how weather processes affect various communities.</li> <li>2. demonstrate the ability to question the accuracy and confidence of weather data and numerical weather forecasts that supports various theories of weather processes.</li> </ol>
<u>MnTC Goal 10a</u>	explain the basic structure and function of various natural ecosystems and of human adaptive strategies within those systems.	<ol style="list-style-type: none"> <li>1. identify characteristics of climate zones around the world and describe the natural processes that affect global and regional climate.</li> <li>2. analyze examples of climate change around the world and explain how humans have adapted to those changes.</li> </ol>

<u>MnTC Goal 10b</u>	discern patterns and interrelationships of bio-physical and socio-cultural systems.	1. explain Ocean-Atmosphere circulations and interrelationships that impact climate and how El-Nino/La-Nina climate changes have impacted regional and global socio-cultural systems.
<u>MnTC Goal 10d</u>	evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions.	1. analyze seasonal weather patterns and explain climatological and geographical distributions of severe weather that has societal impacts.
<u>MnTC Goal 10e</u>	propose and assess alternative solutions to environmental problems.	1. identify ways for communities to mitigate severe weather events and understand the socio-economic impacts of severe weather disasters.
<u>CS</u>	recognize the basic ingredients for severe weather and how the atmosphere functions to create environments for a variety of weather events.	<ol style="list-style-type: none"> <li>1. interpret and plot meteorological surface station data on a map, in order to identify the locations of various fronts, boundaries, and conditions that affect weather.</li> <li>2. diagnose synoptic-scale conditions of air masses, fronts, and midlatitude cyclones that are favorable for severe weather development.</li> <li>3. identify mesoscale environments conducive to forming severe weather.</li> <li>4. explain the evolution and structure of a tropical storm system.</li> </ol>

G. SPECIAL INFORMATION:

This course may require use of the Internet, the submission of electronically prepared documents and the use of a course management software program. Students who have a disability and need accommodations should contact Accessibility Services at the beginning of the semester. This information will be made available in alternative format, such as Braille, large print, or current media, upon request.

H. COURSE CODING INFORMATION:

Course Code C/Class Maximum 48; Letter Grade

Revision date: 11/01/17; 01/06/26

AASC Approval date: 11/21/17; 01/20/26

\*These five MnTC Goals have been identified as Riverland Community College Core Themes. Every course in the Riverland Community College curriculum shall meet outcomes from one of these themes.

\*\*These five MnTC Goals have been identified as Riverland Community College Disciplines. Riverland's MnTC courses also shall meet outcomes from a Discipline Area.

NOTE: The Minnesota Transfer Curriculum "10 Goal Areas of Emphasis" are reflected in the five required discipline areas and five core themes noted in the Riverland Community College program of study guide and/or college catalog.

<b>*Riverland Community College Core Themes</b>	<b>MnTC Goal Number</b>
Critical Thinking (CT)	2
Human Diversity (HD)	7A, 7B, 7A/B
Global Perspective (GP)	8
Ethical and Civic Responsibility (EC)	9
People and the Environment (PE)	10

<b>**Riverland Community College Discipline Areas</b>	<b>MnTC Goal Number</b>
Communication (CM)	1
Natural Sciences (NS)	3
Mathematics/Logical Reasoning (MA)	4
History and the Social & Behavioral Sciences (SS)	5
Humanities and Fine Arts (HU)	6

Riverland