MEEA's "Not the Standards" Guides to the Missouri Learning Standards **– Earth and Space Sciences (ESS)**

3 Core ideas; 12 Components; 60 Learning Standards

Core Ideas > Components v	ESS 1 Earth's Place in the Universe (19)	ESS 2 Earth's Systems (25)	ESS 3 Earth and Human Activity (16)
A	**The Universe and its Stars (9)**	**Earth Materials and Systems (10)**	**Natural Resources (5)**
B	**The Earth and the Solar System (5)**	**Plate Tectonics and Large Scale Systems (3)**	**Natural Hazards (2)**
C	**The History of Planet Earth (5)**	**The Role of Water in Earth's Surface Processes (6)**	**Human Impacts on Earth's System (5)**
D		**Weather and Climate (3)**	**Global Climate Change (2)**
E		**Biogeology (2)**	

Learning Standards

	ESS 1 Earth's Place in the Universe			ESS 2 Earth's Systems				
Grade (# MLS)	**A The Universe and its Stars (9)**	**B The Earth and the Solar System (5)**	**C The History of Planet Earth (5)**	**A Earth Materials and Systems (10)**	**B Plate Tectonics and Large Scale Systems (3)**	**C The Role of Water in Earth's Surface Processes (6)**	**D Weather and Climate (4)**	**E Biogeology (2)**
K (5)		1. relate daylight to time of year		1. use/share observations of weather patterns over time				1. how orgs change env to meet needs
1 (3)	1. describe presence of sun/moon/stars in sky over time 2. use observations to predict their patterns						1. connect weather data and weather phenomena	
2 (4)			1. evidence Earth processes can be fast or slow	1. solutions to slow/prevent wind/water erosion	1. shapes and kinds of land and bodies of water in an area	1. where solid or liquid water is found on earth		
3 (3)							1. show seasonal weather using tables/graphs 2. world climates	
4 (4)			1.changes in landscape over time	1. how weathering and erosion shape earth	1. patterns of Earth's features using maps			
5 (6)	1. distance of stars affects brightness	1. relate amount of daylight to season 2. graph seasonal changes in shadows/ day/night/stars		1. how geo-/bio-/hydro-/atmosphere interact		1. amounts and percentages of water, fresh water in reservoirs on earth		
6-8 (16)	1. lunar phases, eclipses 2. cyclic pattern of seasons 3. gravity -> star, planet motions	1. scale properties of solar system objects	1. geologic time scale	1. internal convection cycles 2. time and spatial scales of surface changes	1. plate motions from fossils, rocks, continents, seafloor	1. water cycle 2. weather conditions from air masses 3. atmospheric, oceanic circulation causes and patterns		
9-12 (19)	1. nuclear fusion and life span of sun 2. Big Bang Theory 3. how stars produce elements	1. Kepler's Law	1. plate tectonics 2. Earth's history from 4.6 bybp	1. continental and sea-floor feature formation 2. how Δ in one system can Δ another 3. matter cycling by thermal convection 4. how energy into and out of Earth's system can change climate		1. investigate properties of water, effects on Earth materials and surface processes	1. quant model of carbon cycling	1. co-evol Earth's system and life

	ESS 3 Earth and Human Activity			
Grade	**A Natural Resources (5)**	**B Natural Hazards (2)**	**C Human Impacts on Earth's System (6)**	**D Global Climate Change (3)**
K	1. relationship between organisms' needs and where they live		1. solutions to reduce human impacts on local environments	
1				
2				
3		1. solutions to reduce weather hazard impact		
4	1. solutions to reduce Earth processes impacts			
5			1. ways communities use science to protect Earth	
6 - 8	1. uneven distribution of resources due to Earth processes, human activities	1. forecast future catastrophes	1. effect of human population growth and per capita consumption on Earth 2. method for monitoring/minimizing human impact	1. analyze evidence of warming over last century
9-12	1. how natural resources, hazards, changes in climate have influenced human activity 2. competing design solutions for resources based on cost/benefit		1. simulate relations among natural resources, human populations, biodiversity 2. evaluate/refine technological solutions to human impacts	1. evidence-based forecast of global or regional climate change and impacts 2. how human activity affects Earth system relations positively and negatively

Symbols and Abbreviations
: proportional to, in relation to
-> causes or has an effect on
= equals
/ separating items on a list
Δ change in or change

Goals of the MEEA NtS Guides
1.To help narrow the search for a specific standard with which a lesson aligns,
2. to make connections and guide curriculum development for standards covered in the same grade,
3. and to provide a map for the development of a concept from Kindergarten to High School so educators know how a concept fits into the big picture, and when might be the best time to teach it based on students' developmental ages.

How to Use the MEEA NtS Guides
1. If you have a lesson to teach, scan for the core idea, the component and then the learning standard that fits best – then look up the full standard description at https://dese.mo.gov/college-career-readiness/curriculum/missouri-learning-standards
2. If you have an audience to teach, scan across its grade level to see which standards might line up with a lesson you have or would like to create – then look it up

NGSS Science and Engineering practices
1. ask questions and define problems
2. develop and use models
3. plan and carry out investigations/fair tests
4. analyze and interpret data
5. use mathematics and computational thinking
6. construct explanations and design solutions CEDS
7. engage in argument from evidence
8. obtain, evaluate and communicate information

NGSS Cross Cutting Concepts
1. Patterns
2. Cause and Effect: Mechanism and explanation
3. Scale, Proportion and Quantity
4. Systems and System Models
5. Energy and Matter: Flows, cycles and conservation
6. Structure and Function
7. Stability and Change
https://www.nextgenscience.org

Socio-scientific Issues
SSI are complex, contested social questions with a scientific component. They provide an authentic opportunity to dig into science concepts. All environmental issues are SSI.
https://serc.carleton.edu/sp/library/issues/what.html

5 E Model – Engage, Explore, Explain, Elaborate, Evaluate - https://bscs.org/bscs-5e-instructional-model