

CONCEPT AND SKILL SYNTHESIS OF NGSS STANDARDS HIGH SCHOOL GRADES 9-11

Key:

- Concepts and skills are organized cognitively according to generality, complexity, and abstractness. The accompanying documents of *Concept and Skill Analysis* show the complete comprehensive structures and how the NGSS standards fit therein.
- Grayed, small font: No standards are allocated, but the concept/skill is an intermediate level in a comprehensive structure of concepts/skills.
- Percentages show how many of the NGSS standards were allocated to the basic concept.

TRANSFERABLE CONCEPTS		
BASIC CONCEPT	SUB-CONCEPT	SUB-SUB-CONCEPT
LANGUAGE OF SCIENCE 25% of standards	ENTITY, SYSTEM, MATTER	HIERARCHY OF MATTER
		BULK SCALE
		MOLECULAR SCALE
		ATOMIC SCALE
	NUCLEAR AND ELEM. PARTICLE SCALE	
	HIERARCHY OF LIFE	
	PROPERTY/MEASUREMENT	
	PROCESS/CHANGE	CYCLE
		CORRELATION, CAUSALITY
INTERDEPENDENCE/ ECOSYSTEM 9%	COMPLEMENTARITY	CARRYING CAPACITY (NATURAL LIMITS)
		CYCLE
ENERGY 10%	ENERGY FORMS & TRANSFORMATION	NUCLEAR/MASS ENERGY
	HEAT TRANSFER	
WAVES 7%	PRODUCTION, ABSORPTION, PROPAGATION	
	DUALITY (WAVE-PARTICLE) a	
GROWTH, DEVELOPMENT 1%	DIFFERENTIATION, SPECIALIZATION	
CHEMICAL REACTION 10%	CHEMICAL ENERGY, THERMAL ENERGY	
	KINETICS	CHEMICAL EQUILIBRIUM
REPRODUCTION, HEREDITY 4%	GENETIC CODE, CODE	EXPRESSION
EVOLUTION 7%	SELECTION	
MOTION and FORCES 7%	FORCES, NET FORCE, NEWTON'S 1 st and 3 rd LAWS	
	ACCELERATION, NEWTON'S 2 nd LAW	
	CONSERVATION OF MOMENTUM	
REGULATION (CONTROL) 1%		
ELECTRICITY & MAGNETISM 1%		
UNDERLYING TRANSFERABLE SKILLS		
MAJOR SKILL	SUB-SKILL	SUB-SUB-SKILL
THE DESIGN PROCESS 11%	IDENTIFY PROBLEM/GOAL	CRITERIA, CONSTRAINTS
	EVALUATE SOLUTION	COSTS, BENEFITS, TRADE-OFFS