



2023 GKC Science & Engineering Fair Categories & Sub-Categories

1. Animal Sciences (AS)

- ...ologies (mammalogy etc.)
- Anatomy
- Development
- Ecology
- Husbandry
- Mendelian Genetics
- Nutrition & Growth
- Physiology
- Systematics

2. Behavioral & Social Science (BE)

- Animal Behavior (Ethology)
- Anthropology
- Human Behavior
- Learning
- Linguistics
- Perception
- Psychology
- Social Media
- Sociology

3. Chemistry (CH)

- Analytical
- Environmental
- Computational
- Organic
- Inorganic
- Materials
- Physical
- Nanomaterials

4. Chemical Energy (CE)

- Alternative Fuels
- Batteries
- Chemical Pollution
- Fluid & Gas Dynamics
- Fossil Fuels
- Microbial Fuel Cells
- Remediation
- Solar materials
- Thermodynamics
- Waste Management

5. Computational Science, Bioinformatics & Math (Computer Applications) (CM)

- Algebraic Analysis
- Bioinformatics
- Biomedical Engineering
- Biomodeling
- Combinatorics
- Deductive Study of Numbers
- Game Theory
- Genomics
- Geometry
- Graph Theory
- Neuroscience Modeling
- Probability & Statistics
- Pharmacology
- Topology

6. Computer Systems, Electronics, Robotics (CS)

- Algorithms
- Cognitive & Control Systems
- Data Analysis
- Energy Conservation
- Information Systems – Structure & Processes
- Integrated Optics, Sensors
- Machine Learning (AI)
- Microcontrollers
- Network Design & Operations
- Operating Systems
- Programming Networking, Languages & Data Communications
- Robotic Mechanics
- Software Design
- Systems Design

7. Earth & Environmental Science (Measurement & Monitoring) (EA)

- Atmospheric Science
- Climatology
- Geosciences
- Meteorology
- Mineralogy
- Oceanography
- Populations & Communities
- Recycling
- Seismology
- Waste Management
- Water Science
- Aquifers, pollution

8. Energy & Environmental Engineering (Theoretical, Energy Consumption) (EE)

- Acoustics,
- Bioremediation, Reclamation, Recycling
- Fluid & Gas Dynamics
- Hydro Power
- Magnetism
- Nuclear Power
- Optics
- Particle, Nuclear, Atomic
- Plasma
- Pollution Control
- Renewable Energies
- Semiconductors
- Solar Materials
- Solid State
- Superconductivity
- Sustainable Design
- Thermal, Geothermal Power
- Thermodynamics
- Water Resources Management
- Wind Power

9. Engineering Mechanics (EM)

- Aerospace, Aeronautical
- Civil Engineering
- Computational Mechanics
- Control Theory
- Industrial Engineering
- Mechanical Engineering
- Naval Systems
- Space Travel – Rockets *et.*

10. Materials Science (MS)

- Biomaterials
- Ceramics & Glasses
- Composite Materials
- Electronic, Optical, Magnetic Materials
- Nanomaterials
- Polymers & Plastics

11. Microbiology (MI)

- Antibiotics
- Antimicrobials
- Bacteriology
- Environmental Microbiology
- Microbial Genetics
- Prions
- Prokaryotic Processes and Organelles
- Virology

12. Molecular Bio/Chem & Health Sciences (MO)

- Biochemistry
- Cell Physiology
- Diagnostics
- Disease
- Drug Development
- Epidemiology
- Eukaryotic Genetics
- Immunology
- Neurobiology
- Nutrition
- Pathology

13. Physics & Astronomy (PA)

- Astronomical Motion, Composition, Energy
- Astronomy
- Atomic, Nuclear Physics
- Biophysics
- Celestial Evolution
- Computational Astrophysics
- Computational Physics
- Condensed Matter & Materials
- Cosmology
- Electromagnetics
- Lasers, Masers
- Mechanics
- Molecular Physics
- Optics
- Plasmas
- Theoretical Physics

14. Plant Science (PS)

- Agronomy
- Classification & Systematics
- Ecology
- Hydroponics
- Pathology
- Physiology
- Plant Growth
- Plant Mendelian Genetics
- Plant Structure
- Life Cycles
- Taxonomy

15. Inventions (grades 4-8 only) (NV)

Greater Kansas City Science & Engineering Fair Category Descriptions

(Note: Your project may fit more than one category, so choose the best fit)

Animal Science (AS): Study of animals, their life cycles, anatomy, and classification; physiology; animal husbandry; entomology; ichthyology; ornithology; herpetology; mammalogy; development; nutrition and growth; animal Mendelian genetics; ecology; systematics and evolution.

Behavioral and Social Sciences (BE): Study of human & animal behavior; social & community relationships; psychology (cognitive, physiological, social); sociology; anthropology; linguistics; learning; perception; reading problems; educational testing; social media dynamics.

Chemistry (CH): Study of the composition, structure, properties, and reactions of matter. Includes all forms of chemistry investigations – analytical; environmental; computational; inorganic; organic; materials; physical; and nanomaterials.

Chemical Energy (CE): Alternative fuels; fossil fuel energy, fuel cells and battery development; microbial fuel cells (also **MI**); solar materials; fluid and gas dynamics; thermodynamics; remediation; waste management; chemical pollution.

Computational Science, Bioinformatics and Mathematics (CM): *Applications of computers to analyze a particular problem – see CS below for computer systems.* **Biological applications of computers:** biomedical engineering; various computer applications, including pharmacology, biomodeling, bioinformatics; evolutionary biology; neuroscience, and genomics. **Mathematics:** the study of measurement; properties and relationships of quantities and sets; using numbers and symbols; deductive study of numbers, geometry, various abstract constructs, sets or structures; algebra analysis; combinatorics; graph theory; game theory; topology; number theory; probability and statistics.

Computer Systems, Electronics, Robotics (CS): **Computers include:** the study of information processes including structures, process procedures, implementation of processing systems; systems analysis and design; data analysis; network design and operations; application and system software design; programming; data center operations; networking and data communications; algorithms. **Electronics:** circuits; microcontrollers; integrated optics; sensors; signal processing; energy conservation. **Robotics:** biomechanics; cognitive systems; control theory; machine learning (includes AI); robotic kinematics; algorithms; databases; operating systems; programming languages.

Earth and Environmental Sciences (EA): *EA differs from EE by measuring/monitoring these areas, not applying a solution to problem.* **Earth Science:** the study of science related to plant earth to include geosciences; mineralogy; water science; physiography; oceanography; meteorology; speleology; seismology; geography. **Ecology:** populations, communities; ecosystems. **Environmental Science** *defined Man's interaction with the ecosystem:* climatology; atmospheric science; environmental effects on ecosystems; geosciences, (mining, fracking etc.); water sciences (aquifers, pollution); recycling; waste management; water resources management.

Energy and Environmental Engineering (EE): **Energy:** solar; Power including hydro, nuclear, solar, thermal, geothermal, wind; sustainable design; renewable energies – also includes the theories, principles and laws governing energy and the effect of energy on matter – solid state; optics; acoustics; particle; nuclear; atomic; plasma; superconductivity; fluid and gas dynamics; thermodynamics; semiconductors; magnetism; quantum mechanics; biophysics. **Environmental Engineering:** *EA differs from EE by applying science to solve a problem* and includes bioremediation, land reclamation, pollution control, recycling and waste management; water resources management.

Engineering Mechanics (EM): Engineering including aerospace and aeronautical, civil, mechanical; computational mechanics; control theory; ground vehicle systems; industrial engineering-processing; naval systems; space travel equipment such as rockets, etc.

Materials Science (MS): Biomaterials; ceramics and glasses; composite materials; computation and theory (as applied to materials) electronic materials; optical materials; magnetic materials; nanomaterials; polymers; plastics.

Microbiology (MI): Antimicrobials; antibiotics; bacteriology; applied microbiology; environmental microbiology; microbial genetics; virology; prions; study of prokaryotic cell processes and organelles.

Molecular Bio/Chem & Health Sciences (MO): Study of vital processes occurring in living macromolecular systems (Eukaryotic) including the processes by which these substances enter into, or are formed in the organisms (chemically and/or genetically), and/or react with each other and the environment; biochemistry (analytical, medicinal, structural); disease diagnostics and treatment: drug development and testing; epidemiology; nutrition; physiology; pathology; cell physiology; eukaryotic genetics; immunology; neurobiology; pathophysiology.

Physics and Astronomy (PA): **Physics:** atomic, molecular, optical, biological, computational, nuclear and particle physics, theoretical; condensed matter and materials; instrumentation; magnetism – electromagnetic and plasmas; mechanics; optics, lasers, and masers. **Astronomy:** Anything in the universe beyond Earth such as the positions, dimensions, distribution, motion, composition, energy, & evolution of celestial bodies and related phenomena; astronomy; cosmology; computational astrophysics.

Plant Science (PS): Study of plants and their life cycles; structure; growth; macro processes, classification; evolution; agronomy; macro genetics; development; pathology; physiology; organics; GMO's; taxonomy; ecology; hydroponics.

Inventions (NV): (Grades 4-8 only) Creation or modification of devices or processes that solve or alleviate challenges in our lives.