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**2021 GKC Science & Engineering Fair Categories & Sub-Categories**

1. **Animal Sciences (AS)**

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

1. **Behavioral & Social Science (BE)**

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

1. **Chemistry (CH)**

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

1. **Chemical Energy (CE)**

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

1. **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

1. **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

1. **Earth & Environmental Science (Measurement & Monitoring) (EA)**

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

1. **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

1. **Engineering Mechanics (EM)**

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

1. **Materials Science (MS)**

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

1. **Microbiology (MI)**

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

1. **Molecular Bio/Chem & Health Sciences (MO)**

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

1. **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

1. **Plant Science (PS)**

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

1. **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; mammalology; 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; magnetics – 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.