Category/Division Policy

The Colorado Science and Engineering Fair offers students in grades 6 – 12 the opportunity to compete in one of the following categories in either the Junior (6th – 8th grades) or Senior (9th – 12th grades) Division. Team projects are studies conducted by two or three students in any discipline where all students on a team are in grades that fall within the same division.

The **Animal Sciences** category includes studies that relate to all aspects of animals (including insects) and animal life; animal life cycles; animal interactions with one another; or the thought processes and behaviors of animals in their interactions with the environment.

> For Example: structure, physiology, development & classification of animals; animal ecology; animal husbandry; nutrition & growth; genetics; systematics & evolution; entomology; ichthyology; ornithology; herpetology; cytology; histology; cellular physiology; etc.

The **Behavioral & Social Sciences** category includes studies that relate to the thought processes and behaviors of humans in their interactions with the environment using observational and experimental methods.

> For Example: clinical & developmental psychology; cognitive psychology; neuroscience, physiological psychology; sociology; social psychology; etc.

The **Biomedical & Health Sciences** category includes studies that relate to human health, such as the diagnosis, treatment, prevention or epidemiology of diseases and other damage to the human body or mental systems as well as internal or external impacting factors (feedback mechanisms, stress, environment). It can also include studies that relate to the improvement of human health and longevity by translating novel discoveries in the biomedical sciences into effective activities and tools for clinical and public health use.

> For Example: cell, organ & systems physiology; genetics & molecular biology of disease; immunology; nutrition & natural products; pathophysiology; disease detection & diagnosis; disease prevention; disease treatment & therapies; drug identification & testing; pre-clinical studies; biomaterials & regenerative medicine; biomechanics; biomedical devices; biomedical sensors & imaging; cell & tissue engineering; synthetic biology; etc.

The **Chemistry** category includes studies that relate to the science of the composition, structure, properties and reactions of matter not involving biochemical systems. It can also include studies that relate to the integration of various material forms in systems, devices and components that rely on their unique and specific properties. This involves their synthesis and processing in the form of nanoparticles, nanofibers, and nanolayered structures or measurements of various properties and characteristics of the structure across length scales, in addition to multi-scale modeling and computations for process-structure and structure-property correlations.

> For Example: analytical chemistry, computational chemistry; environmental chemistry; inorganic chemistry; materials chemistry; organic chemistry; physical chemistry; biomaterials; ceramic and glass composite materials; computation and theory; electronic, optical and magnetic materials; nanomaterials; polymers; etc.

The **Earth & Environmental Sciences** category includes studies that relate to Earth systems and their evolution along with the environment and its effect on organisms and/or systems.

> For Example: atmospheric science; climate science; geosciences; environmental effects on ecosystems; water science; etc.

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The **Energy** category includes studies and processes that relate to the production and/or storage of energy.

> For Example: biological processes & designs; solar processes, materials & design; energy storage; wind & water power generation; hydrogen generation & storage; thermal generation & design; triboelectric & electrolysis; etc.

The **Engineering** category includes studies that relate to the science and engineering involving the movement and stability of structures It can also include studies that relate to the use of machine intelligence to reduce the reliance on human intervention. It can also include studies that relate to electrical systems in which information is conveyed via signals and waveforms for purposes of enhancing communications, control and/or sensing.

> For Example: aerospace & aeronautical engineering; civil engineering; computational mechanics; control theory; ground vehicle systems; industrial engineering processing; mechanical engineering; naval systems; biomechanics; cognitive systems; control theory; machine learning; robot kinematics; circuits; internet of things; microcontrollers; networking & data communication; sensors; signal processing; etc.

The **Environmental Engineering** category includes studies that relate to the engineering or development of processes and infrastructure involved in solving environmental problems in the supply of water, the disposal of wastewater or the control of pollution.

> For Example: bioremediation; land reclamation; pollution control; recycling & waste management; water resources management; etc.

The **Mathematics & Computer Sciences** category includes studies that relate to the measurement, properties and relationships of quantities and sets, using numbers and symbols as well as the deductive study of numbers, geometry and various abstract constructs or structures. It also includes studies that relate to the discipline and techniques of computer science and mathematics as they relate to biological systems and those related to the development of software, information processes or methodologies to demonstrate, analyze or control a process or solution.

> For Example: algebra; analysis; combinatorics, graph theory & game theory; geometry & topology; number theory; probability & statistics; computational biomodelling; computational evolutionary biology; computational neuroscience; computational pharmacology; genomics; algorithms; cybersecurity; databases; human/machine interface; languages & operating systems; mobile apps; online learning; etc.

The **Micro & Molecular Biology** category includes studies that are related to micro-organisms, including bacteria, viruses, fungi, prokaryote, and simple eukaryotes as well as antimicrobial and antibiotic substances. It can also include studies related to the understanding of life and cellular processes at the molecular level, such as the structure, function, intracellular pathways and formation of cells.

> For Example: antimicrobials & antibiotics; applied microbiology; bacteriology; environmental microbiology; microbial genetics; virology; cell physiology; genetics; immunology; molecular biology, neurobiology; etc.

The **Physics & Astronomy** category includes studies that relate to the science of matter and energy and the interactions between the two as well as the study of anything in the universe beyond the Earth.

> For Example: atomic, molecular & optical physics; astronomy & cosmology; biological physics; condensed matter & materials; nuclear & particle physics; optics; theoretical, computational & quantum physics; etc.

The **Plant Sciences** category includes studies that relate to plants and how they live, including structure, physiology, development and classification.

> For Example: agriculture & agronomy; ecology; genetics & breeding; growth & development; pathology; plant physiology; systematics & evolution; etc.

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