

## 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 (6<sup>th</sup> – 8<sup>th</sup> grades) or Senior (9<sup>th</sup> – 12<sup>th</sup> 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.

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### Animal Sciences:

- Studies related to all aspects of non-human animals (including insects), animal life, animal life-cycles, animal health and medicine, animal behavior, and animal interactions with one another or their 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.

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### Behavioral & Social Sciences:

- Studies related to the thought processes and behavior of humans in their interactions with the environment as studied through observational and experimental methods.

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

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### Chemistry & Biochemistry:

- Studies related to the chemical basis of processes occurring in living organisms, including the processes by which these substances enter into, or are formed in the organisms and react with each other and the environment.

For Example: analytical biochemistry; general biochemistry; medicinal biochemistry; structural biochemistry; etc.

- Studies related to the composition, structure, properties and reactions of matter.

For Example: analytical chemistry, computational chemistry; environmental chemistry; inorganic chemistry; materials chemistry; organic chemistry; physical chemistry; etc.

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### Earth & Space Sciences:

- Studies related to Earth systems and their evolution.

For Example: atmospheric science; climate science; geosciences; petrology; mineralogy; paleontology

- Studies related to anything in the universe beyond the Earth.

For Example: astronomy & cosmology; theoretical & computational astrophysics; etc.

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### Energy:

- Studies related to biological and chemical processes of renewable energy sources, clean transport, and alternative fuels.

For Example: alternative fuels; computational energy science; fossil fuel energy; fuel cells & battery development; microbial fuels cells; solar materials; etc.

- Studies related to renewable energy structures and processes including energy production and efficiency.

For Example: hydro power; nuclear power; solar; sustainable design; thermal power; wind; etc.

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## Engineering:

- Studies related to electrical systems in which information is conveyed via signals and wave forms for purposes of enhancing communications, control and/or sensing.

For Example: circuits; internet of things; microcontrollers; networking & data communication; optics; sensors; signal processing; etc.

- Studies related to science and engineering that involves movement or structure. The movement can be by the apparatus or the movement can affect the apparatus.

For Example: aerospace & aeronautical engineering; civil engineering; computational mechanics; control theory; ground vehicle systems; industrial engineering processing; mechanical engineering; naval systems; etc.

- Studies related to the characteristics and uses of various materials with improvements to their design which may add to their advanced engineering performance.

For Example: biomaterials; ceramic & glass; composite materials; computation & theory; electronic, optical & magnetic materials; nano materials; polymers; etc.

- Studies related to the use of machine intelligence to reduce the reliance on human intervention.

For Example: biomechanics; cognitive systems; robot kinematics; etc.

- Studies related to the application of engineering principles and design concepts to medicine and biology for healthcare purposes including diagnosis, monitoring and therapy.

For Example: biomaterials & regenerative medicine; biomechanics; biomedical devices; biomedical imaging; synthetic biology; etc.

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## Environmental Sciences:

- Studies related to the environment and its effect on organisms/systems, including investigations of biological processes such as growth and life span.

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

- Studies related to the engineering or development of processes and infrastructure to solve environmental problems in the supply of water, the disposal of waste or the control of pollution.

For Example: environmental effects on ecosystems; water science; ecology; air pollution & quality; soil contamination & quality; bioremediation; land reclamation; pollution control; recycling & waste management; water resources management; etc.

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## Mathematics & Computer Sciences:

- Studies related to the measurement, properties, and relationships of quantities and sets, using numbers and symbols.

For Example: algebra; analysis; combinatorics, graph theory & game theory; geometry & topology; number theory; probability & statistics; etc.

- Studies related to the discipline and techniques of computer science and mathematics as they relate to biological systems.

For Example: computational biomodeling; computational evolutionary biology; computational neuroscience; computational pharmacology; etc.

- Studies related to the development of software, information processes or methodologies to demonstrate, analyze, or control a process/solution.

For Example: algorithms; cybersecurity; databases; programming languages; operating systems; control theory; machine learning; etc.

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## **Medicine & Health:**

- Studies related to the issues of human health and disease.

For Example: dentistry, disease diagnosis; disease treatment; drug development & testing; epidemiology; nutrition; physiology & pathology; genomics; etc.

- Studies related 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: disease detection & diagnosis; disease prevention; disease treatment & therapies; drug identification & testing; pre-clinical studies; etc.

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## **Microbiology & Molecular Biology:**

- Studies related to micro-organisms.

For Example: antimicrobials & antibiotics; applied microbiology; bacteriology; environmental microbiology; microbial genetics; virology; etc.

- Studies related to the structure, function, intracellular pathways, and formation of cells. Studies involve understanding life and cellular processes at the molecular level.

For Example: cell physiology; genetics; immunology; molecular biology; neurobiology etc.

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## **Physics:**

- Studies related to the science of matter and energy and of the interactions between the two.

For Example: atomic, molecular & optical physics; biological physics; computational physics; condensed matter & materials; instrumentation; magnetics, electromagnetics & plasmas; mechanics; nuclear & particle physics; optics, lasers & masers; quantum computation; theoretical; physics; etc.

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## **Plant Science:**

- Studies related to plants and how they live, including structure, physiology, development and classification.

For Example - agronomy; growth & development; ecology; genetics/breeding; pathology; physiology; systematics & evolution; etc.