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Life sciences

Projects in this category deal with an aspect or a way of life of an organism. Life sciences is divided up into three major sections:

- 1 – Biology (animal, general, human and plant)
- 2 – Biochemistry
- 3 – Medicine and health sciences

Animal biology

Animal anatomy

The study of the structure and form of animals and the relationships among their various organs.

Project ideas

- The anatomy of spiders
- The anatomy of molluscs
- The anatomy of birds
- Body types
- Abnormal body types
- Muscular contraction in frogs
- Highly developed incisors in elephants as a form of defence
- Why eviscerate game animals?
- Edible animal viscera

Entomology

The study of insects.

Project ideas

- The well organized ant society
- Communication among insects
- Animals' ability to protect themselves from the cold
- The life cycle of yellow jacket wasps

Herpetology

The study of reptiles.

Project ideas

- Reptile classification
- Ichthyosaurus—gone and forgotten
- Why do snakes shed their skin?

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Mammalogy

The study of mammals.

Project ideas

Sounds of cetaceans
 The origin of cetaceans
 Why do whale tails have a horizontal axis?
 The many uses of elephant trunks
 Aerial, aquatic and land mammals
 Primates

Ornithology

The study of birds.

Project ideas

Urban birds
 Why do some birds migrate while others do not?
 Palmipeds

Animal pathology

The science that studies diseases and their effects on animals.

Project ideas

Myxomatosis in rabbits
 Creutzfeld-Jacob disease and mad cow disease
 Parrot fever
 Gid—an unusual disease

Animal physiology

The science that studies the normal functioning of animal organs and tissues.

Project ideas

The physiology of tree frogs
 Blood circulation
 Animal blood
 Animal digestion (piscivores, carnivores, owl pellets)
 Why are amphibians able to live on land and in water?
 Cutaneous respiration in frogs
 Butterfly reproduction
 Ovoviviparity
 Oviparous vs. viviparous animals
 Hermaphrodites

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Aquatic science and technology

The study of animals that live in water.

Project ideas

Why are there methane hydrates on the ocean floor?
 Oyster culture
 Aquaculture
 Mussel culture
 The work of fish farmers
 The zebra mussel—a filtering organism
 The capacity of zebra mussels to store inorganic pollutants
 Gastropods
 Cephalopods
 Bivalves

Zoology

The study of animals.

Project ideas

Psittacines: the parrot family

General biology

Cytology

The part of biology that studies cell formation and cell life.

Project ideas

Cell function
 The process of cell adhesion
 Myeloblast

Embryology

The science that deals with embryos and the different embryonic stages.

Project ideas

In-vitro fertilization
 The different embryonic stages
 Chicken embryos

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Helminthology

The study of parasitic worms.

Project ideas

Tapeworms

Eelworms vs. flatworms

Histology

The science that deals with cell and tissue structure.

Project ideas

Energy production inside chloroplasts

ATP liposomes

Embryonic stem cells

Comparing two breast cancer tissue staining techniques

Cryonics

Parasitology

The science that studies parasites.

Project ideas

Pesticides

Parasitic worms

Plant parasites

Malaria

Herbicides

The fermentation process

Stachybotry chartarum—a harmful black mould

Phytophthora

Bacteriology

The branch of microbiology that deals with bacteria.

Project ideas

The bactericidal effect of commercial acne lotions

Group A streptococcus or flesh-eating bacteria

Ice-forming bacteria

Is antibacterial soap more effective than regular soap?

Which disinfectant is the most effective?

Bacteria

Bacterial resistance

Meningococcus

The bacteria *Neisseria meningitidis*

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Virology

The branch of microbiology that deals with viruses.

Project ideas

Epidemics
 Can viruses be used in war?
 Viruses
 The Ebola virus
 Virus strategies for entering cells
 Cold viruses
 The work of virologists
 Rabies in animals and humans

Human biology

Human anatomy

The study of the structure and form of humans and the relationships among their various organs.

Project ideas

The anatomy of the skin
 The structure of the eye
 The anatomy of the ear
 The anatomy of the brain

Angiology

The study of the vessels of the body, that is, arteries, veins and lymph vessels.

Project ideas

The anatomy of the heart

Human morphology

The study of the external structure and form of humans.

Project ideas

Malformations and deformities

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Myology

The part of anatomy that deals with the muscles.

Project ideas

Muscular contractions
Muscle asthenia
Myopathy

Osteology

The part of anatomy that deals with the bones.

Project ideas

The anatomy of the teeth
Osteitis
Osteosynthesis

Splanchnology

The part of anatomy relating to the study of the viscera.

Project ideas

Organ transplantation

Gerontology

The study of phenomena relating to the aging of the human organism.

Project ideas

Do the elderly have problems with insomnia?

Immunology

The branch of medicine that deals with phenomena relating to immunity.

Project ideas

Strict hygiene decreases the risk of infection in children
How different classes of antibiotics work
Vaccines
Immunotransfusion
The phenomenon of rejection in the field of organ transplantation
Acquired immunity vs. innate immunity

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Oncology

The study of cancerous tumours.

Project ideas

What is cancer?

Skin cancer

Is there a link between psychology and the neurological and immune systems in the onset of cancer.

Is aspartame a carcinogen?

The effects of vitamin D and calcium on the growth of cancerous skin cells

Do sunscreens really provide effective protection against skin cancer?

Human pathology

The science that studies diseases and their effects on humans.

Project ideas

The effects of Creutzfeld-Jacob disease and mad cow disease on humans

The pathological aspects of Siamese twins

Uterine myoma

Scoliosis

Osteoporosis

Human physiology

The science that studies the normal functioning of human organs and tissues.

Project ideas

The role of sense of smell in love

Dandruff

Physiological reactions to different drugs

The physiology of the brain

The physiology of the liver

Hypnosis: myth or reality, or hypnosis: entertainment or science?

The physiological effects of music on humans

How the brain analyzes and interprets information captured by the retina

The effects of electrical and magnetic fields on nerve impulses

The steps involved in memorization

Hemispheric synchronization

Myelin

The stages of sleep

The role of the sense of smell

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What is Alzheimer's disease?
 The neuromodulation properties of Ginkgo biloba
 Voluntary motor control
 Muscles involved in locomotion
 Neuron functions
 The different nerves and their roles
 The elements of nerve tissue
 Cerebral hemorrhage
 Congenital heart malformation
 The mechanism of cardiac contraction
 Cardiac catheterization
 Arterial blockage
 Artificial blood
 High cholesterol
 Blood circulation
 Varicose veins
 Anemia
 The role of hormones
 Different types of glands
 What happens when the thyroid malfunctions?
 The importance of the pituitary gland
 The different kidney diseases
 Renal colic
 Why can hemodialysis replace kidneys?
 Food allergies
 The immune system
 AIDS
 Serology and serotherapy
 The elements of the mouth essential to the proper functioning of the digestive system
 Digestion
 Fermentation
 Harelip
 Factors that influence hunger
 The effectiveness of toothpastes
 How do the organs of the digestive system work?
 How to keep food fresh
 Fatty acids
 Vitamin C in fruits and vegetables
 Dehydrated food
 Using fish skin to manufacture gelatin
 Food additives
 The diabetic diet
 The process of elimination
 Mating
 The mysteries of life
 Herpes

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Understanding STDs
 Testing for STDs
 How does the contraceptive pill work?
 The organs of the reproductive system
 Gemellity and multiple births
 The causes of infertility
 What happens when we drown?
 Hyaline membrane disease (HMD) or respiratory distress in newborns
 How do the lungs work?
 Asthma
 Inhalation and exhalation
 The different respiratory disorders

Physiopathology

The study of organ disorders that arise as a disease progresses.

Project ideas

The malfunctioning of certain organs resulting from Guillain-Barré syndrome

Thanatology

The scientific study of death.

Project ideas

Thanatopraxis

The medicolegal study of circumstances resulting in death

Toxicology

The study of poisons.

Project ideas

The various drugs in sports

The world of narcotics

The phenomenon of dependence

Toxic substances in cigarettes

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Plant biology

Plant anatomy

The study of the structure and form of plants and the relationships among their various organs.

Project ideas

The pitcher plant—an indigenous carnivorous plant
The study of leaf veins

Ampelography

The scientific study of vines.

Project ideas

The classification of grape varieties
Wine growing in Quebec

Plant physiology

The science that studies the normal functioning of plant organs and tissues.

Project ideas

Does a green plant change colour if exposed to coloured light?
Can a plant in an enclosed environment satisfy its own needs?
The nitrogen, phosphorous and potassium needs of beans
How does the *Mimosa pudica*—commonly known as the sensitive plant—react to stimuli?
Photosynthesis in green plants and algae
The effects of carbon dioxide on the foliar respiration of plants
What is photosynthesis?
Forget-me-nots
Hydroponics
Using computers to grow cacti
Ivory plants
Phototaxis
Plant phyllotaxis
Sac fungi
Edible mushrooms
Germination
The role of stamens and pistils
Protogyny is less common than protandry
Asexual reproduction

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Phytopathology

The science that studies diseases and their effects on plants.

Project ideas

Phylloxera

Phytopharmacy

The study and preparation of products used to treat plant diseases.

Project ideas

Phytosanitary products

Pest control products

Biochemistry

Nucleic acids

Molecules with a large molecular mass; they are formed through the polymerization of numerous nucleotides.

Project ideas

Nucleic acids

Deoxyribonucleic acid

Using the structure of DNA to solve computer problems

Dinosaur DNA

The Ames test

DNA methylation

The molecular structure of DNA

Tracing a criminal

DNA testing

The importance of a research protocol

Micromanipulation

Gene therapy

The gene that determines eye colour according to Mendel's theory

The development of genetic or hereditary diseases

Hereditary diseases

Predicting the colour of a colt

Winter wheat has genes that provide resistance to cold

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Anabolism and catabolism

Two opposite phases that are part of the process of metabolism. The first involves the synthesis of complex molecules, while the second involves breaking down organic compounds into simpler substances, thereby producing energy.

Project ideas

The biochemistry of love at first sight

Does the addition of a ubiquinone molecule affect energy production?

Biochemical catalysis

A change in chemical reaction that takes place in a living organism under the influence of a substance that is not itself in any way changed.

Project ideas

How can a small organic molecule attached to an enzyme activate it?

Enzymes

The fermentation of milk

Enzyme washing

Biological cells and membranes

Cells are basic structural and functional units of all living organisms, while membranes are thin, soft sheets of tissue lining or covering some part of the body.

Project ideas

The constituents of living matter, from amino acids to cells

Interactions between antioxidants and free radicals

Cell apoptosis

Proteins known as “molecular chaperones”

Structure and function of proteins, lipids, etc.

Lipids are primarily involved in the construction of cell membranes. Proteins have multiple functions, including immune protection and the transportation of molecules in the body and in cells.

Project ideas

Using liposomes to encapsulate a drug

The biochemical effect of cholesterol

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Medicine and health sciences

Allergology

The study of allergies.

Project ideas

How do allergies develop?

Some people can die from a bee sting!

Anesthesiology

The branch of medicine that deals with anesthesia and resuscitation.

Project ideas

Types of anesthesia

How do anesthetics work?

Audiology

The study of hearing.

Project ideas

Cochlear implants

Hearing aids

Cardiology

The study of the heart and its pathologies.

Project ideas

Myocarditis

Heart transplants

Balloon angioplasty

Porphyria—the basis of the vampire legend

Chiropraxis

A system of treating disease by manipulation of various parts of the body.

Project ideas

Manipulations of the vertebral column

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Surgery

The treatment of disease, injury, etc. by using the hands or instruments to mend or remove an organ, tissue, or part, or to remove foreign matter in the body.

Project ideas

Bone marrow transplant
 What is a graft?
 Does all surgery involve risk?
 Xenotransplantation (transplanting animal cells, tissues or organs into humans)
 Osteoclasia
 Splenectomy

Dentistry

The branch of medicine that deals with the care of the teeth and associated structures.

Project ideas

Xylitol to the rescue of oral bacteria
 Why grow molars if they have to be removed?
 Devitalization
 The effectiveness of toothpastes

Dermatology

The branch of medicine that studies and treats skin diseases.

Project ideas

Types of grafts for burn victims
 Skin grafts
 Discomforts associated with psoriasis
 Albinism

Dietetics

The science concerned with applying the principle of nutrition to the feeding of people under various economic conditions or for therapeutic purposes.

Project ideas

Diet for cardiac patients
 Desserts for diabetics
 Food combinations
 The Montignac diet

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Ergotherapy

Rehabilitation treatment for disabled people through physical or manual effort adapted to their abilities.

Project ideas

Prosthetic devices—a bonus for disabled people
Learning to live with one less limb

Gastroenterology

The study of the physiology of the stomach and intestine and, by extension, the entire digestive system.

Project ideas

Stomach ulcers
Gastritis
Colitis or inflammation of the colon
Crohn's disease
Dysentery

Geriatrics

A medical specialty concerned with aging.

Project ideas

The symptoms of senility
Gerontism or premature aging in children

Gynecology

The branch of medicine that deals with diseases specific to women.

Project ideas

Is the “big operation” inevitable?
The phenomenon of hot flashes
Menopause
Premenstrual syndrome (PMS)
The menstrual cycle

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Hematology

The science of the blood, its nature, functions, and diseases.

Project ideas

The different blood types
 Dealing with hemophilia
 Detecting diseases of the blood

Veterinary medicine

The diagnosis and treatment of diseases of animals, whether pets or livestock.

Project ideas

Castration
 Artificial insemination of livestock

Alternative medicine

Anything given to or done to a patient by a practitioner whose interventions are based on a body of consistent practices and teachings outside the limits of conventional medicine.

Project ideas

Reflexology
 Music therapy
 Iridology
 Naturopathy
 Acupuncture
 Homeopathy

Neurosurgery

Surgery of the nerves and the nervous system.

Project ideas

Should a brain tumour be operated on?
 Lobotomy

Neurology

The branch of medicine that deals with diseases of the nervous system.

Project ideas

The consequences of a spinal cord lesion on the nervous system
 Cerebral paralysis
 Reflex sympathetic dystrophy

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Spina bifida
 Treatment in a hyperbaric chamber
 Spinal cord myelitis

Obstetrics

The branch of medicine that deals with pregnancy and delivery.

Project ideas

Miscarriage
 Midwives vs. obstetricians
 The miracle of birth
 Premature births

Ophthalmology

The branch of medicine that deals with the structure, function and diseases of the eye.

Project ideas

Eye diseases
 Ophthalmoscopy
 Eye pathologies
 Photophobia

Optometry

The profession of examining the eyes for defects in vision and prescribing lenses to correct such defects.

Project ideas

Optometer
 Hypermetropia and myopia
 Corneal lenses

Orthodontics

The branch of medicine that deals with the straightening or adjusting of irregular or crooked teeth.

Project ideas

How do braces work miracles?

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Orthopedics

The branch of medicine that studies and deals with the skeletal system, muscles and tendons.

Project ideas

The menisci
 An artificial hip
 How fractures are repaired
 Recurring tendonitis

Speech therapy

The use of special techniques for correction of speech and language disorders.

Project ideas

Minimal pairs—an excellent learning method for children
 Dystonia

Orthoptics

The medical discipline whose aim is to correct visual disorders related to uncoordinated eye movements.

Project ideas

Strabismus
 Ametropia

Otorhinolaryngology

The branch of medicine that deals with diseases of the ears, nose and throat.

Project ideas

Hematotympanum, mumps and other ear problems
 Laryngotomy

Pediatrics

The branch of medicine that deals with children's diseases.

Project ideas

Treating tonsillitis
 Meningitis kills children

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Pharmacology

The science of drugs and their preparation, uses and effects.

Project ideas

Analgesics

The placebo effect

Can liposomes help eliminate pain?

Aricept and Alzheimer's disease

Is Viagra really a miracle drug?

Hormone therapy

Neovostat—an experimental drug made from shark cartilage

Physiotherapy

The treatment of disease by physical agents: air, water, light, exercise and manipulation.

Project ideas

The work of physiotherapists

Phytotherapy

The treatment of diseases using plants.

Project ideas

Can garlic act as an antibiotic?

Jerusalem artichoke has properties that are beneficial for diabetics

The steps involved in bottling flowers as perfume fragrances

Onions, ginger and Echinacea against *E. coli*

Pneumology

The study of the lungs and related diseases.

Project ideas

What is pneumoconiosis?

The different pulmonary diseases

Podology

The study of the foot and its disorders.

Project ideas

Do orthotics in shoes really help?

Ingrown toenails

Athlete's foot

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Proctology

The branch of medicine that deals with the anus and the rectum.

Project ideas

Why is proctoscopy performed?

An artificial anus

Psychiatry

The branch of medicine that deals with mental disorders.

Project ideas

Autism

Schizophrenia

Radiology

The study of the medical applications of X-rays and other ionizing radiation.

Project ideas

How does radiation therapy work?

Myelography

Urography

Rehabilitation

The reduction of sequela following an accident or operation in order to help a person resume a normal life.

Project ideas

Myoelectric prosthesis

The benefits of electrotherapy

Rehabilitation for paraplegics

Rhumatology

The branch of medicine that deals with different types of rheumatism.

Project ideas

Rheumatism

Rheumatoid arthritis

Arthritis

Osteoarthritis

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Urology

The branch of medicine that deals with urinary tract disorders.

Project ideas

Genitourinary diseases