Project Titles from Regeneron ISEF 2021

This list is to aid with category selection by providing examples of real project titles from Regeneron ISEF 2021. To see abstracts and more titles from previous years go to the ISEF projects database.

ANIMAL SCIENCES (Code: ANIM)

Animal Behavior (BEH): *The Effect of Sugar Concentration Found in Popular Soft Drinks on Armadillidium vulgare's Innate Behavior Patterns*

Cellular Studies (CEL): *No sample project title provided*

Development (DEV): *Effects of 20-Hydroxyecdysone and Calcium Supplemented Prednisone on the Body Length of Drosophila melanogaster*

Ecology (ECO): *What Affects Bird Diversity in Urban-Rural Transition Zones?*

Genetics (GEN): *Investigation on High Twinning Rates in Cattle Using Sanger Sequencing*

Nutrition and Growth (NTR): *Auto-dissemination: A Novel and Effective Tool in Mosquito Control?*

Physiology (PHY): *No sample project title provided*

Systematics and Evolution (SYS): *Seeing in a New Light: Adaptive Changes in Opsin Proteins in Antarctic Icefish*

BEHAVIORAL AND SOCIAL SCIENCES (Code: BEHA)

Clinical and Developmental Psychology (CLN): *Autest: Culturally Adapted Risk Assessment Game for Autism Spectrum Disorder*

Cognitive Psychology (COG): *Significant Zero: The Effect of Personality Questionnaires on Identity-Relevant Choices*

Neuroscience (NEU): *The Effect of Constraining Eye Movements on Learning Gains and Retention*

Physiological Psychology (PHY): *Analyzing Eye-Movement Data to Evaluate Motor Cognition Functionality for Early Detection of Neurological Conditions Using Deep Learning*

Sociology and Social Psychology (SOC): *Can We Differentiate Between Computer Generated and Human Art? Spot the Fake!*

BIOCHEMISTRY (Code: BCHM)

Analytical Biochemistry (ANB): *Investigating Absorption of iron(II) by Apo Lactoferrin Using pH*

General Biochemistry (GNR): *Investigating the Effects of Disaccharides and Monosaccharides on the Rate of Respiration in Saccharomyces cerevisiae (S. cerevisiae)*

Medicinal Biochemistry (MED): *Investigating the Biochemical Activity of Organic Curcuma caesia and Curcuma longa (Turmeric) on Neuroblastoma Cancer Cells*

Structural Biochemistry (STR): *No sample project title provided*

BIOMEDICAL AND HEALTH SCIENCES (Code: BMED)

Cell, Organ, and Systems Physiology (PHY): *Investigating Bone Morphogenetic Protein 4 as a Potential Regulator of the Age Related Increase in Risk for Alzheimer's Disease: The Regulation of the Unfolded Protein Response and Apolipoprotein E Expression in Astrocytes*

Genetics and Molecular Biology of Disease (GEN): *Comparative Analysis of Genetic Mutations and Overall Survival in Patients with Glioblastoma Multiforme: A Retrospective Cohort Study*

Immunology (IMM): *Analysis of the Correlation Between Immunogenomic Phenotype and Patient Outcomes for Prostate Cancer*

Nutrition and Natural Products (NTR): *Breakdown of Gluten Proteins Using a Newly Identified Combination of Fruit Derived Enzymes to Alleviate Symptoms of Gluten Intolerance*

Pathophysiology (PAT): *Linking Continued Exposure to E-Cigarette Vapor Constituents with Chronic Obstructive Pulmonary Disease*

BIOMEDICAL ENGINEERING (Code: ENBM)

Biomaterials and Regenerative Medicine (BMR): *Biomaterial Fabrication Technique: Using Decellularized Plants as Perfusable Engineering Scaffolds*

Biomechanics (BIE): *No sample project title provided*

Biomedical Devices (BDV): *ARTHETA-0: An Innovative, Affordable Approach to the Onsite, Rapid 3D Printing of Artery Stents, Parameterized to Fit Individual Patients' Needs*

Biomedical Sensors and Imaging (IMG): *Max Health: A Smart Textile Biosensor System for Remote Health Monitoring and Anomaly Detection*

Cell and Tissue Engineering (CTE): *No sample project title provided*

Synthetic Biology (SYN): *Customized 3D Printing of Live Cells for Novel Bio-circuitry*

CELLULAR AND MOLECULAR BIOLOGY (Code: CELL)

Cell Physiology (PHY): *Examining the Effect of Fibroblast Growth Factors on Development of Mammary Gland in 3D Cultures*

Cellular Immunology (IMM): *Extrathymic T-Cell Development in the Mesenteric Lymph Nodes of Mice*

Genetics (GEN): *Identification and Analysis of Key Candidate Genes and Pathways in Lung Adenocarcinoma by Integrated Bioinformatics*

Molecular Biology (MOL): *Assessing the Expression of Angiogenesis-Related Receptors in Endothelial Cell RNA*

Neurobiology (NEU): *In Amyotrophic Lateral Sclerosis (ALS) Patient Tissue, UG Rich RNA Is Not Preferentially Soluble as Predicted*

CHEMISTRY (Code: CHEM)

Analytical Chemistry (ANC): *Sulfur Dioxide Quantification: Improvements to the Classical Ripper Titration Using Colorimetric Analysis*

Computational Chemistry (COM): *Development of a Novel Machine Learning Algorithm in Biomolecules and Drugs for Measuring Molecular Surface Area: Applications in Long QT Syndrome and Neurodegenerative Diseases*

Environmental Chemistry (ENV): *Biodegradable Plastics Made from Waste Biomethane*

Inorganic Chemistry (INO): *No sample project title provided*

Materials Chemistry (MAT): *Artificial Photosystems: New Approach to the Synthesis of Boron-Doped Carbon Material from Plastic Wastes for Solar Energy Conversion Applications*

Organic Chemistry (ORG): *Novel Synthesis of Important Pharmaceutical Compounds using Visible Light and a Photocatalyst*

Physical Chemistry (PHC): *New Methods for Computing the Configurational Entropy of Deeply Supercooled Liquids with the Potential Energy Landscape*

COMPUTATIONAL BIOLOGY AND BIOINFORMATICS (Code: CBIO)

Computational Biomodeling (MOD): *Extreme Gradient Boosted Classification and Regression Trees to Predict Outcomes in Patients with Monoclonal Gammopathies of Undetermined Significance*

Computational Epidemiology (EPD): *The Development of an Artificial Intelligence Model to Predict Weekly COVID-19 Cases Using Important Socioeconomic Variables*

Computational Evolutionary Biology (EVO): *Determining Factors that Improve the Efficiency of Capture-Recapture*

Computational Neuroscience (NEU): *Application of EEG Signal Analysis and Machine Learning on Neonatal Seizure Prediction*

Computational Pharmacology (PHA): *OrphaDRGL: A Novel Graph Deep Learning-based Drug Repositioning Approach for Orphan Diseases*

Genomics (GEN): *The Genetics of Human Aging: Predicting Age and Age-Related Diseases by Deep Mining High Dimensional Biomarker Data*

EARTH AND ENVIRONMENTAL SCIENCES (Code: EAEV)

Atmospheric Science (AIR): *A Novel Deep Learning Model for Estimating Tropical Cyclone Intensity from Satellite Images*

Climate Science (CLI): *Polar Vortex and Long-Duration Events: Climate Change in the U.S. and Canada*

Environmental Effects on Ecosystems (ECS): *Environmental Impact of Batteries on Animal and Human Health Through Soil and Groundwater Contamination*

Geosciences (GES): *Identifying Invertebrate Fossils in the Field Utilizing Machine Learning with a Novel 3D Augmentation Approach*

Water Science (WAT): *Plant Based Water Purification*

EMBEDDED SYSTEMS (Code: EBED)

Circuits (CIR): *"Raksha": System for Prevention of Electrocution and the Hazardous Effects of Short Circuits*

Internet of Things (IOT): *Preventing Elevated Indoor Carbon Dioxide Levels Using an Arduino Based IoT System*

Microcontrollers (MIC): *No sample project title provided*

Networking and Data Communications (NET): *A Novel AI-Based GPS Anti-spoofing System with Subspace Differential Direction-of-Arrival Estimation and Deep Learning Against Dynamic Spoofers*

Optics (OPT): *Poly-open LIDAR: Fast and High Resolution Adaptive LIDAR with original Multi-Opening Polygon Mirror System*

Sensors (SEN): *A Crash and an Airbag: Creating a Algorithm for an External Airbag System*

Signal Processing (SIG): *A Non-invasive Electromyographic Interface for Hand Gesture Recognition with Active Noise Suppression Using a Combined Biosignal Processing Algorithm*

ENERGY: SUSTAINABLE MATERIALS & DESIGN (EGSD)

Biological Process and Design (BIO): *Utilizing Eukaryotic Saccharomyces cerevisiae as an Electricigen in Both Pure & Co-Culture in the Anode of a Microbial Fuel Cell*

Solar Process, Materials, and Design (SOL): *Investigation of Spectral Response and Efficiency of Boron and Nitrogen-doped Diamond-like Carbon as the Top Junction in Multijunction Silicon Solar Cells*

Energy Storage (EST): *Recovery of Lithium and Cobalt from Waste Li-ion Batteries with a Newly Developed Method*

Wind and Water Movement Power Generation (FLD): *Making a Saguaro H.A.W.T. (Horizontal Axis Wind Turbine)*

Hydrogen Generation and Storage (HYD): *Photochemical Hydrogen Production Using Tea Leaf Residue and Iron Ions*

Thermal Generation and Design (THR): *Characterizing the Electrical and Thermal Performance of a Circular Exhaust Pipe Thermoelectric Generator*

Triboelectricity and Electrolysis (ELC): *Developing a Wearable Triboelectric Nanogenerator to Sustainably Power Biosensors*

ENGINEERING TECHNOLOGY: STATICS AND DYNAMICS (Code: ETSD)

Aerospace and Aeronautical Engineering (AER): *Autonomous Hybrid Drone System for Human Rescue*

Civil Engineering (CIV): *The Utilization of Dimples to Reduce Wind Load on Parabolic Structures*

Computational Mechanics (COM): *Creating a One-Thousand Dollar Supercomputer*

Control Theory (CON): *Staying Dry: Notification System for Incontinence Underwear*

Ground Vehicle Systems (VEH): *Proposal of an Electro-Mechanical System to Reduce the Fatality of Car Underride Crashes*

Industrial Engineering-Processing (IND): *No sample project title provided*

Mechanical Engineering (MEC): *Improving Print Quality, Precision and Repeatability of Open Source MSLA 3D Printer*

Naval Systems (NAV): *CPS - Custom Printed Submarine: A Community Based Approach to Designing Unmanned Underwater Vehicle Systems Using 3D Printing and Widely Available Production Methods*

ENVIRONMENTAL ENGINEERING (Code: ENEV)

Bioremediation (BIR): *The Application of Mycoremediation Upon Cigarette Filter Waste*

Land Reclamation (ENG): *Separating Microplastics from Beach Sand Using a Fluidized Air Bed*

Pollution Control (PLL): *Filter-Free Air Filtration System Based on Nano Steam Technology*

Recycling and Waste Management (REC): *Post-pyrolysis Processing of Mixed Polymeric Waste to Obtain Useful Organic Raw Materials*

Water Resources Management (WAT): *Using a Positive Charged Media to Remove Different Heavy Metal Ions from Contaminated Water Samples*

MATERIALS SCIENCE (Code: MATS)

Biomaterials (BIM): *The Development of Helicoid-Shaped Model for Increasing Flow Rate of Removing Blood Clots in Medical Treatments*

Ceramic and Glasses (CER): *Synthesizing c-Si3N4 from Extreme Temperature and Pressure Conditions*

Composite Materials (CMP): *Study on Exceptional Hydrogen Storage in High Entropy Alloys*

Computation and Theory (COM): *No sample project title provided*

Electronic, Optical and Magnetic Materials (ELE): *Construction of Thermal Conductivity Measurement Platform Based on 3-Omega Method*

Nanomaterials (NAN): *A Liquid-Liquid Extraction to Purify Magnetite Nanoparticles*

Polymers (POL): *Testing the Safety and Viability of a Cross-linked Starch-Based Bioplastic in Food Packaging and Food Industry Applications*

MATHEMATICS (Code: MATH)

Algebra (ALB): *Solving Some of the Algebraic Equations Using Trigonometry*

Analysis (ANL): *Modeling COVID-19: Simulating the Effects of Waning Immunity Using a New Multi-Compartment Epidemiological Model*

Combinatorics, Graph Theory, and Game Theory (CGG): *Ranking of the Vertices in a Weighted Graph*

Geometry and Topology (GEO): *Novel Methods for Shape Classification, Analysis, and Synthesis Using the Isoperimetric Profile and Mathematical Morphology*

Number Theory (NUM): *Cracking the Infinite Shuffle: Solving the Kimberling Sequence Problem*

Probability and Statistics (PRO): *College Football Playoff Expansion: A Statistical Analysis via Monte Carlo Simulation*

MICROBIOLOGY (Code: MCRO)

Antimicrobials and Antibiotics (ANT): *Sugar and Spice, Aren't They Nice? Is Garlic, Ginger, Cinnamon, or Honey More Effective than Antibiotics against Bacteria?*

Applied Microbiology (APL): *Prevention of Healthcare Associated Infections using Antibacterial Boron Carbonitride Nanoparticle Coating on Medical Devices*

Bacteriology (BAC): *No sample project title provided*

Environmental Microbiology (ENV): *Viral Abundance in Terrestrial Cyanobacteria Differs as a Function of Host Ecology*

Microbial Genetics (GEN): *Plasmids of Curtobacterium: a Nexus of Carbohydrate Utilization Genes*

Virology (VIR): *Prophylactic and Therapeutic Roles of Glycyrrhiza glabra in the Prevention and Treatment of COVID19*

PHYSICS AND ASTRONOMY (Code: PHYS)

Atomic, Molecular, and Optical Physics (AMO): *Measurement of Film Thickness of Antibubble Using Interference of Transmitted Light*

Astronomy and Cosmology (AST): *Mapping the Extent of Neutral Hydrogen Cloud Near Sagittarius A* at 1420 MHz*

Biological Physics (BIP): *Earthquakes in the Inner Ear: A Novel Finite Element Simulation Modelling the Mechanism of the Basilar Membrane & Hair Cells*

Condensed Matter and Materials (MAT): *Designing Cups to Adjustable to the Changing Temperatures of Viscous Liquids*

Mechanics (MEC): *The Effects of Mass and Grade on Cycling Effort*

Nuclear and Particle Physics (NUC): *Analyzing Historical Polarization and Orbit Data from Relativistic Heavy Ion Collider (RHIC) Runs*

Theoretical, Computational, and Quantum Physics (THE): *Quantum Machine Learning Simulation of Higgs Boson Charge Parity Symmetry Violation*

PLANT SCIENCES (Code: PLNT)

Agriculture and Agronomy (AGR): *How Do Various Pesticides Affect Soil Health and Plant Development?*

Ecology (ECO): *When Two Problems Meet: Analysis and Prediction of the Spread of Invasive Plant Species in Relation to the Changing Environment*

Genetics and Breeding (GEN): *Identification and Characterization of a Gene Controlling Tomato Growth and Branching*

Growth and Development (DEV): *The Effect of Mycorrhizae Inoculant on Plant Growth*

Pathology (PAT): *Lipopolysaccharide (LPS) and Galactose Induce Cell Death in Prothallial Cells of Gametophytes of Ceratopteris richardii*

Plant Physiology (PHY): *The Effect of Elevated CO2 and Nitrogen Deposition on Constitutive and Induced Phenolic Levels in Pole Bean (Phaseolus vulgaris)*

Systematics and Evolution (SYS): *No sample project title provided*

ROBOTICS AND INTELLIGENT MACHINES (Code: ROBO)

Biomechanics (BIE): *Engineering a Robot Arm with Computer Vision and Simulated Grabbing for Manipulation of Objects*

Cognitive Systems (COG): *An Improved Method for the Stable Transmission of Quantitative Information through Human Skin, Characterized by Low Error Rates and Long-term Reliability*

Control Theory (CON): *A Biologically Inspired Game Theoretic Adversarial Training Method*

Machine Learning (MAC): *Generating Police Sketches Using a Generative Machine Learning Algorithm*

Robot Kinematics (KIN): *Omni-wheel Based Circular Orbit Flight Simulator for G-Force Generation*

SYSTEMS SOFTWARE (Code: SOFT)

Algorithms (ALG): *Utilizing the Heuristic A* Search Algorithm to Determine the Shortest Path Between Locations on a Floorplan*

Cybersecurity (CYB): *Breaking the Substitution Cipher: Coding an Automatic Cipher Solver*

Databases (DAT):

Human/Machine Interface (HMC): *An Intelligent Assistive Human Emotion Recognition and Adjustment System*

Languages and Operating Systems (LNG): *No sample project title provided*

Mobile Apps (APP): *Safe Woman: Creation and Development of an Innovative Mobile Application for the Safety of Women*

Online Learning (LRN): *Creation and Application of Virtual Laboratory in Teaching*

Translational Medical Science (Code: TMED)

Disease Detection and Diagnosis (DIS): *Using Post-Illumination Pupil Response as a Novel Biomarker for Parkinson's Disease*

Disease Prevention (PRE): *Evaluation of Gherkin's (Cucumis anguria L.) Bioactive Potential Against Non-communicable Chronic Diseases*

Disease Treatment and Therapies (TRE): *Plectra Gold: Herbal Honey Formulation as an Effective Relief for Common Respiratory Diseases such as Flu, Cough and Sore Throat*

Drug Identification and Testing (DRU): *An Atypical Cure for Atopic Dermatitis: Investigating the Effects of L-Histidine on Filaggrin Expression*

Pre-Clinical Studies (PCS): *A Hopeful SSc Drug: Immune Regulation of Astragalus (Huangqi) in the Treatment of Systemic Scleroderma (SSc)*