



وزارة التعليم
Ministry of Education



**University Vice Presidency for Postgraduate Studies and Scientific
Research**

Deanship of Scientific Research

**The University's Priorities in Research, Development, and
Opportunities for Cooperation**

First Priority:

1. Construction

- Smart Buildings

Smart buildings are control systems that facilitate and organize the connection of all building systems from electricity, security, monitoring, firefighting, anti-theft, access control, water management, sewage management, parking management and also services. All this through a sophisticated electronic system that meets all needs.

- Advanced Building Materials

The architectural field is witnessing a remarkable and rapid development in an attempt to meet the needs of the intellectual and applied development of the users of modern and smart buildings, which led to the need to develop building materials to keep pace with these modern requirements in terms of the materials used and their characteristics, as well as at the level of the machines used in construction operations.

- Materials Development

Day after day, man aspires to harness all natural and industrial products to serve him and to develop life in line with industrial, technological and social development, something that necessitated major development processes and work to improve the properties of materials to become multifunctional with high quality, taking into account the cost of production.

- Energy

The energy axis represents one of the pillars of scientific research and its priorities during the current and future period, as the world is witnessing real competition in the fields of energy improvement, storage and transmission, where energy is the real and actual driving force for recycling the production machine of any country.

- Nanotechnology

Nanotechnology is at the forefront of the most priority fields in physics, chemistry, biology, engineering, medicine, aviation and many other fields. It gave great hope for scientific revolutions in the future that will change the direction of technology in many applications

- Organic Materials

The production and recycling of organic materials and improving their properties represent one of the axes of industrial and food production, which can have an impact on improving and providing countries' resources industrially and technologically. It can also play an important role in saving production costs.

Second Priority:

2. Environmental and agricultural sustainability

- Pollution

Environmental pollution is one of the most serious treatments that threaten the quality of life, as the sources of pollution varied from biological, radiological, and chemical, which greatly

threatened the quality of agricultural products, which are among the targets of countries for the growth of the national agricultural product.

- Agriculture and Irrigation

The development of new and advanced means and techniques in the methods of agriculture and irrigation, and attempts to improve the product and its production mechanisms, is one of the important axes for the development of all agricultural production.

- Plants and Animals

The plant and animal axis represents one of the most important pillars of food and pharmaceutical production, and therefore research based on plants and animals is considered one of the most important sources of development for raw materials, drug manufacturing and food security.

- Waste Management

With the increase in industrial and technological production processes and the use of organic, chemical and radioactive sources, the problems of specialized waste management in how to manage, dispose and store them come from research axes in which scientific research does not stop as a reflection of the permanent development in the areas of use

- Food Security

Food security is one of the axes of public security for countries, where the operations of providing food resources represent a great interest from governments and strategic administrations.

Third Priority:

3. Health care

- Electronic Medicine

Exposure to the Corona pandemic during the past period has resulted in a lot of development of digital tracking and monitoring mechanisms related to human health, infection detection and disease transmission, and the matter has evolved in order to develop advanced mechanisms for communication between the patient and the concerned authorities, including doctors and others, in addition to the administrative authorities who grant powers and approvals and others. Hence, the field of digital health has become one of the newly developed fields that did not have much activation, and these days are witnessing a great and rapid development in this field.

- Non-communicable Diseases

Countries are experiencing massive changes in the health needs of their populations. Whereas non-communicable diseases (such as cancer, diabetes, heart disease, and nutritional diseases) have quickly tended to take the place of some traditional diseases, such as infectious diseases and malnutrition. Therefore, it is necessary to focus research on finding solutions to such diseases.

- Infectious Diseases

There are many infectious diseases (such as the coronavirus) that greatly affect human life. And as we have seen, scientists have moved greatly to solve such diseases because of their great impact on human life and the use of vaccines to avoid infection

- Genetic Diseases

Many diseases in humans are caused by genetic factors and genetic diseases arise as a result of a change in the DNA sequence. Genetic diseases can sometimes result from changes in the DNA of somatic cells or cells other than germ cells.

- Managing Health Crises

The need began in the modern era for an independent science of crises, and how to manage and confront them. It is a science based on a set of scientific foundations, principles and concepts. The health crisis management aims to control sudden and exacerbated events, deal with them, classify them and confront their effects and results, and it is a management based on study and research, knowledge and experiences learned, planning and using information and data as a basis for sound decision. In other words, it is a set of coordinated and planned measures to deal with and control any emergency crisis, and an example of this is the role of the Kingdom of Saudi Arabia in managing the Corona pandemic crisis from the beginning to limit the disease and reduce its infection.

- Early Childhood Care

Early childhood, defined as the period from birth to eight years of age, is a period of marked development when brain development is at its peak. During this stage, children are highly influenced by the environment and the people around them. Early childhood care is one of the important matters that requires raising awareness to preserve the family.

Fourth Priority;

4. Information and Communication Technology

- Digital Education

Digital education has become a part that cannot be overlooked in teaching and learning mechanisms, as it has recently represented the actual alternative to direct education. Digital education has proven to be very effective, which prompted specialists to make the greatest effort in developing learning platforms, interactive education, and distance education. Therefore, the development of education methods has become one of the research axes. For many educational and commercial institutions producing such platforms and applications.

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- Smart Cities

Man is witnessing a great social and societal development during the current time, as life in closed communities, small or large, has become the goal of many, as all means of life and security are available in these cities, which requires drawing and planning these modern cities and implementing them using advanced scientific and technical means, and even permanent development.

- Electronic Government

The electronic government (e-government) has achieved outstanding successes, which had a noticeable impact on the well-being of citizens' lives, and also achieved a great deal of time wasted in accomplishing many government departments quickly, organizing administrative communication and distinguished linking between e-services portals to facilitate service users. And e-services are among the fields that work on, develop and improve service levels, which requires constant work and research.

- Electronic Commerce

The world has witnessed a lot of social distancing mechanisms during the recent period, coinciding with commercial globalization and the entry of parent companies into commercial markets, which has increased e-commerce operations and the development of their platforms. This effort also combines with researching mechanisms to ensure electronic security and ensure the quality of service and services provided.

- Cybersecurity

Cybersecurity is the process of protecting systems, networks, and programs from targeted digital attacks by accessing, altering, damaging or extorting sensitive information. Security Approach Successful cybersecurity takes a particular approach that usually consists of multiple layers of protection spread across the computers, networks, programs or data one intends to keep safe and in any organization the users, processes and technology must complement each other and join hands to create an effective defense from cyber attacks.

- Big Data

The world is now very interested in analytical science and issuing decisions on a well-studied scientific basis, forcing data managers to deal with big data at the level of large institutions and countries, which necessitated the development of large data management and preservation processes to obtain from them accurate and direct explanations and information, and then programming and its applications must be developed to deal with such a large amount of data, as well as the devices and machines used to deal with it.

Fifth Priority:

5. Renewable energy

- Solar Energy

Solar energy is one of the most important alternative energy sources that the world seeks to exploit in order to preserve the environment and develop sustainable green resources. Which serves homes and enables them to reduce electricity expenditures to zero.

- Batteries and Energy Storage Technologies

It is the preservation of the energy produced at a specific time in order to benefit from it at a later time. In general, a device that stores energy is called a battery or accumulator. Energy appears in many forms. Energy storage involves the transfer of energy from forms that are difficult to store to forms that are easy to store or have low costs. Common examples of energy storage include: a rechargeable battery, which stores chemical energy that is easily converted into electrical energy to power a mobile phone, hydroelectric dams that store gravity potential energy in tanks, and ice storage tanks that keep ice frozen using cheap nighttime energy In order to meet the demand for cooling during daylight hours.

- Smart Grids

The smart grid is the electrical network in which communication technologies are used to collect information from points of consumption, generation and transmission of electricity and then

modify the work of the network based on this information. The information that can be collected is abundant and rich, for example: consumer electricity consumption patterns (houses, factories...etc), generation patterns for power plants, especially renewable energy such as wind and solar energy, which are all characterized by fluctuations in generation rates, and other important information in network performance.

Sixth Priority:

6. Petroleum and petrochemical

- Modern Transformational Technologies

In recent years, the oil and gas industry has started to use modern technologies that increase the efficiency of petroleum materials and track stocks and available supplies needed for the industry in a way that reduces costs, increases energy and money savings, raises the international economy, increases security and safety, and introduces modern methods for converting crude oil from Fossil fuels are converted into renewable materials and converted into environmentally friendly materials by reducing the waste generated from it, making it more used, and eliminating pollution resulting from this industry, which leads to raising the economy of the country in which the raw material is located.

- **Specialized Petrochemicals**

The Kingdom is working to enhance the volume of investment in the petrochemical industry, in a step that would raise the contribution of the private sector to the GDP

The total, which enhances the country's trade balance, at a time when economists see that the Kingdom represents the depth of global investment in the petrochemical industry.

- **Substitute Materials**

Natural and artificial alternative materials contribute to raising the wheel of the country's economy without compromising the surrounding environmental rules, which is in line with the Kingdom's vision.

Seventh Priority:

7. Social and economic development

- Drugs and Crime Confrontation

Drugs are among the aspects that pose a danger to members of society, and there are many parties that seek to abolish them. The specialists also carry out comprehensive awareness-raising about drugs and confronting crime by conducting studies and research to assess cases and find solutions.

This issue is very important for the stability of society, as the Saudi government is striving to reduce it.

- Vocational Rehabilitation

A process that enables people with functional, psychological, developmental, cognitive, and emotional disabilities or health conditions to overcome barriers that prevent them from accessing,

maintaining, or returning to other useful jobs or occupations. The role of specialists comes in developing many suggestions and conducting various studies to serve them.

- Social Development (divorce, family violence, raising children, academic achievement)

The role of the family is very important for the integrity of society, so holding awareness sessions for family affairs and conducting the necessary studies for this aspect of the areas that the Kingdom of Saudi Arabia focuses on.

- Islamic Studies and Culture

The Noble Qur'an and the Sunnah of the Prophet are important pillars of social development, and religion influences knowledge and research in the Islamic community. It discussed many topics for social and economic development.

- Woman Role

In line with the empowerment of women, which is one of the provisions of the 2030 vision of the Kingdom, where job opportunities will be provided to about one million Saudi women by 2030, and to end the structural patterns of women's work and men's work, the Kingdom of Saudi Arabia seeks to encourage Saudi women to study various disciplines, especially the study of science and technology, mathematics, and engineering disciplines.

- Education

Education represents the first pillar for the development of the human factor and is considered one of the strategic priorities of all developed, middle and developing countries. Education is

witnessing a remarkable development in the mechanisms and platforms of electronic, digital, applied and professional education, which urge researchers in this field and related fields to work on developing educational mechanisms and maximizing the benefit for all those who use educational services, students, teachers and professors.

-National Identity

National identity expresses the loyalty of every person towards his homeland and is a very important element for the cohesion of society, so addressing this topic in research is an important priority.

- Intellectual Awareness

Intellectual awareness is one of the things that one of us should care about in all fields, not only in the political or philosophical fields, but its concept is broader than that and includes many different areas in life, so parents should be keen to develop its concept within the minds of their children since childhood to have them Their independent personality and opinions sound and mature.

-Pillars of Extremism and Terrorism

Extremism and terrorism are among the causes of the corruption of society. It includes monitoring all forms of the foundations and foundations of extremism and terrorism and its causes and effects, such as adopting extremist ideas or beliefs, or an act issued by an individual or group using violence in its material and non-material forms to influence individuals, groups or governments in order to achieve a specific goal.

Eighth Priority:

8. Water management and production

- Desalination of Water

As a result of the tremendous development, civilizational, economic and industrial progress and the increase in population, the demand for potable water has increased more than many of those available from natural resources, which made attention turn to the desalination of sea water, especially since the Kingdom has been endowed by God with two coasts, namely the coast of the sea Red and the coast of the Arabian Gulf, and increased interest in the establishment of desalination plants, the modernization of roads and the necessary and environmentally friendly equipment, and the discovery of techniques and new methods in order to reduce the cost of the product and preserve the environment.

- Water Leak Detection

The problem of water leakage is one of the problems that plague many countries as a result of the high cost of water desalination or the damages resulting from leaks, whether Environmental or technical, so the water collects near the places surrounding the leak, such as floors and walls, causing damage to them as a result of its interaction with building materials, and erosion.

Iron and concrete wear out, thus exacerbating problems if the treatment is neglected. It also leads to a decrease in production and damage to residential areas.

Agriculture led to the state's interest in how to find modern scientific methods to solve this problem.