Research Strategic Framework – Faculty of Science – January 9, 2016

The Faculty of Science, where we discover the unknown and invent the future.

A. Discovering, understanding and harnessing the fundamental physical laws, the biological processes and the quantitative and mathematical concepts that fuel human imagination and define our physical and living world -

1. new knowledge through creativity-driven research in and across disciplines, expanding the reach of mathematics and computation and elucidating the fundamental laws of nature, the properties of molecules and matter, and the underlying mechanisms of life,
2. the origin, evolution, nature and interrelations of life and all the known and unknown forms it encompasses, from molecular interactions to the diverse ecosystems that constitute the biosphere,
3. the origin, and evolution of the universe, and all the energy, matter, and structure it contains, and
4. the application of scientific knowledge to key challenges including energy, food, health, water, and the sustainability of environments created and continually reshaped by nature and human activity.

B. Catalyzing great insights and advances through the creation of new methods, instrumentation, techniques, and connections -

5. new methods for designing, synthesizing, developing, and analyzing novel materials, from the nano to the macro scale, for all applications from pharmaceuticals, to electronics, to structures,
6. next generation sensors to make the invisible visible, pushing the dimensional frontiers (space and time), dynamic range, applications, availability, scale, and reach,
7. turning data from every domain of human inquiry and practice into information and information into knowledge via improved data handling, predictive modeling, dynamic visualization, characterization algorithms, statistical approaches, new mathematical insights, and advanced computing platforms, and
8. augmenting human creativity and capacity, through the understanding and application of biological and computational intelligence, the nature of consciousness, the way living things (from microbes to plants and animals) learn, respond, and communicate, new approaches to the human-computer-robot interaction, and the expanded use of the scientific method and quantitative analysis to propel progress locally and globally.