Journey To "Cosmos" of the Cell

Course is divided into three (3) parts:
1) Cell and Molecular Biology
2) Cell Reproduction & Genetics
3) Homeostasis & Physiology

three Unifying Concepts .i.e., Unity of Life
Cell Doctrine  Evolution  Bioenergetics

1. Cell Theory...
1665 - 1st cells described by R. Hooke [cork]
1670 - Marcello Malphigi plant tissues may be cellualrs
1805 - Lorenz Oken claims all organisms consist of cells
1839 - Cell Theory formally proposed...
Matthais Schleiden & Theodor Schwann
1858 - Rudolph Virchow: paradigm of the cell theory...
"All cell arise from pre-existing cells"

thus: 1) all individuals derived from a single cell  (egg cell)
2) all organisms are related genetically

Some important facts about cells :
diverse :  many sizes, shapes, and types (165+ in humans)
similarities: have same basic structural plan
- surrounded by cell membrane
- contain nuclei  (bacteria = genophore)
- similar sub-cell parts (ORGANELLES)
- all contain same macromolecules
2. EVOLUTION... "Descent with modification"

1858 Charles Darwin & Alfred Russell Wallace...
2 new ideas about biological patterns in the natural world
...argue all species (past & present) descended from
common ancestor
...hypothesize all species come from preexisting species &
they change through time
...individuals in a population vary in hereditable traits...
- result in vast biological diversity we see in

Living things change gradually over time and
become new forms...
change from one form ............> to another form

MECHANISM of EVOLUTION -
via Natural Selection (SURVIVAL of FITTEST)
- individuals in a population vary in hereditable traits...
- some traits help individuals survive better & reproduce more
- Natural Selection picks individuals better fit to a specific
  environment...
  only those with superior traits .. (physical, behavioral,
  biochemical) are more likely to survive and REPRODUCE.

UNITY comes from fact that all living things
evolved by same rules, the Laws of Evolution
3. BIOENERGETICS - EQUILIBRIUM THERMODYNAMICS...

Science of energy flow and transformation within, through, and between organisms...

"cells do not produce energy - they consume energy"

UNITY comes from fact that the mechanisms & processes of energy change & flow in cells are NOT different, but are the SAME, among different life forms,

Metabolic pathways used by cells are all the same in bacteria, plants and animals
  glycolysis,
  Krebs's cycle,
  oxidative phosphorylation, &
  photosynthesis.

CELL is functional unit of life and all living systems
CELL THEORY is to Biology as Atomic Theory is to physics

a Definition of a Cell:
  A particular organization of matter, bounded by a selectively permeable membrane, that is capable of self-reproduction, without the presence of other living organism (eliminates viruses).

"Living organisms are composed of inanimate molecules... and nothing is alive in a cell except the whole of it?"