

1 | **Biology's Guiding Principles**

1. Simple set of rules dictates self-assembling of systems
2. Units of order/structure contributes to biological system
3. Instructions + rules governing structure and order built into self-contained units that comprise bigger systems
4. Biological systems has many rules of structure that drive changes to behavioral and changes to rules themselves

2 | **Life's levels of organization**

1. Biosphere
2. Ecosystems
3. Communities
4. Populations
5. Organisms
6. Tissue
7. Cells
8. Organelles
9. Molecules

“Biology”, in the most reductionistic sense, is quite deterministic.

But! This is changing. A new field of “systems biology” now includes new understanding and methods to track “rules” across all organizations, and thinking of the whole system, well, as a whole, which of course introduces changes that make biology less deterministic.

3 | **Self-organizing cellular structures**

Individuals who organize into dynamic groups by following simple structures

- Cells follow DNA instructions
- Possibility for custom-engineering cellular constructs through simple rules
- Regenerative organization — creating possible systems to “program” limb generation, “reprogram” cancer cells to change systems + innovate cancer treatment