Module 6: Metabolism — Keys to Success

Learning Objectives

By the end of this module, you should be able to:

1. Apply the laws of thermodynamics to living systems
2. Explain how enzymes function
3. Describe the structure and role of ATP
4. Distinguish anabolic from catabolic pathways
5. Explain redox reactions and feedback inhibition

Key Terms to Know

- **Metabolism** — All chemical reactions in an organism
- **Anabolic** — Building reactions (require energy)
- **Catabolic** — Breakdown reactions (release energy)
- **Enzyme** — Protein that speeds up chemical reactions
- **Substrate** — Molecule that binds to enzyme active site
- **Active Site** — Region where substrate binds to enzyme
- **Activation Energy** — Energy needed to start a reaction
- **ATP** — Adenosine triphosphate; energy currency
- **Oxidation** — Losing electrons (OIL)
- **Reduction** — Gaining electrons (RIG)
- **Feedback Inhibition** — End product inhibits first enzyme

Key Concepts

Laws of Thermodynamics:

1. Energy cannot be created or destroyed (conservation)
2. Every transfer increases entropy (disorder)

ATP Structure:

- Adenine + ribose + 3 phosphate groups
- Energy stored in phosphate bonds

Enzyme Function:

- Lower activation energy
- Not consumed in reaction
- Specific to substrate (lock and key)

Study Tips

1. **Remember OIL RIG** — Oxidation Is Loss, Reduction Is Gain
2. **Know enzyme factors** — Temperature, pH, concentration
3. **Draw ATP → ADP** — Show phosphate release