Module 7: Photosynthesis — Keys to Success

Learning Objectives

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

1. Write and explain the photosynthesis equation
2. Describe chloroplast structure
3. Compare light-dependent and light-independent reactions
4. Trace electron flow through photosystems
5. Explain adaptations in C_4 and CAM plants

Key Terms to Know

- **Photosynthesis** — Converting light energy to chemical energy (glucose)
- **Chloroplast** — Organelle where photosynthesis occurs
- **Thylakoid** — Membrane sacs inside chloroplast
- **Granum** — Stack of thylakoids
- **Stroma** — Fluid surrounding thylakoids
- **Chlorophyll** — Green pigment that absorbs light
- **Light-Dependent Reactions** — In thylakoid; produce ATP and NADPH
- **Calvin Cycle** — In stroma; uses ATP and NADPH to make G3P
- **Photosystem I and II** — Protein complexes that capture light
- **RuBisCO** — Enzyme that fixes CO_2 in Calvin Cycle
- **C_4 Plants** — Separate carbon fixation spatially (corn, sugarcane)
- **CAM Plants** — Separate carbon fixation temporally (cacti, succulents)

Photosynthesis Equation

$$\mathbf{6CO_2 + 6H_2O + light \rightarrow C_6H_{12}O_6 + 6O_2}$$

Key Comparisons

Stage	Location	Input	Output
Light Reactions	Thylakoid	H_2O, light	ATP, NADPH, O_2
Calvin Cycle	Stroma	CO_2, ATP, NADPH	G3P (sugar)

Study Tips

1. **Know the equation** — $CO_2 + H_2O$ + light → glucose + O_2
2. **Trace electron flow** — Water → PSII → PSI → NADPH
3. **Understand chemiosmosis** — H^+ gradient drives ATP synthesis
4. **Compare C_3, C_4, CAM** — How each handles hot/dry conditions