

# Massachusetts Institute of Technology

## Organic Chemistry 5.512

February 28, 2005  
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### Introduction: Strategies for Stereocontrolled Synthesis

#### ★ Thermodynamic Control

*Relative energy of diastereomers determines outcome of reaction*

##### I. What determines the relative energy of stereoisomers?

- ☆ De-stabilizing Non-bonded Repulsion
- ☆ Stabilizing Non-covalent Interactions
- ☆ Stereoelectronic Effects
  - \* Deviation from optimal geometry for orbital overlap (angle strain)
  - \* Destabilizing torsional interactions
  - \* Stabilizing secondary orbital interactions
  - \* Dipole-dipole interactions

##### II. Tactics for establishing thermodynamic control

#### Reading on Stereochemical Principles

Carey and Sundberg "Advanced Organic Chemistry" Part A (2000) Chapters 2 and 3

E. L. Eliel and S. H. Wilen "Stereochemistry of Organic Compounds" (1994)

#### Review of Key Reactions

Carey and Sundberg "Advanced Organic Chemistry" Part B (2000)

- Chapter 1 (Alkylation reactions)
- Chapter 2 (Aldol, Michael, Mannich reactions)
- Chapter 4 (Hydroboration)
- Chapter 9 (Organoboron, silicon, tin chemistry)
- Chapter 12 (Epoxidation)