# Massachusetts Institute of Technology
# Organic Chemistry 5.512

March 2, 2005
Prof. Rick L. Danheiser

# 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**

**II. Tactics for establishing thermodynamic control**

## ★ Kinetic Control

Relative energy of diastereomeric transition states determines outcome

- ☆ **Substrate Control**
  - ✳ Steric Approach Control
  - ✳ Stereoelectronic Control
  - ✳ Internal Stereodirection
- ☆ **Reagent Control**
  - ✳ Achiral Substrate: enantiotopic face selectivity
  - ✳ Achiral Substrate: enantiotopic group selectivity
  - ✳ Chiral Substrate: double asymmetric synthesis
- ☆ **Dynamic Kinetic Resolution**