ChEn 1703
Introduction

http://www.che.utah.edu/~sutherland/1703

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Administrative Stuff

- Course website: http://www.che.utah.edu/~sutherland/1703
  - Lecture notes available before class, podcasts of lectures available after class.
  - Wiki pages (http://www.che.utah.edu/~sutherland/wiki) have tutorial information on MATLAB topics.
  - Help/questions: 1703help@gmail.com
- Instructor:
  - James C. Sutherland, 394 INSCC, 585-1246
  - Office hours (tentative): Tuesday 2:00-4:00 pm & Thursday 10:30 am -12:00 pm
- Teaching Assistants:
  - Prashanth Mandalaparty, Craig Emmet, Courtney Gonzales
- Email - You will receive emails through your umail address.
- Learning - a joint endeavor.
- Homework
  - Assignments posted on course web site.
  - Electronic submission
  - Working together is good - Copying & plagiarism is very bad.

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Computer Lab Access

- CADE Labs (in WEB 224/226)
  - Windows, Mac, Linux
  - Go to the CADE lab to activate your account.
- Library Labs (Marriot Library)
  - Windows machines run MATLAB, Mac machines do not.
  - Your UNID and CIS password can log you on.
- ICC (MEB 2285) - ChEn computer lab.
  - Windows machines
  - You have access for this semester
  - To log in:
- Help sessions TBD.

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Tips for Success

- Don't get behind! Start homework early!
- Be curious - try things out & experiment on what we discuss in class. (Rework examples from class).
- Come to class prepared (read the book, look at the lecture notes)
- Attend help sessions.
- When confused/frustrated, ask for help.

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Course Objectives

- Learn about Chemical Engineering
- Learn problem solving strategies & tools
- Become proficient with a few software packages for problem solving:
  - MATLAB - very powerful "programming language" with many built-in tools.
  - Excel - spreadsheet that can be used to solve many types of problems

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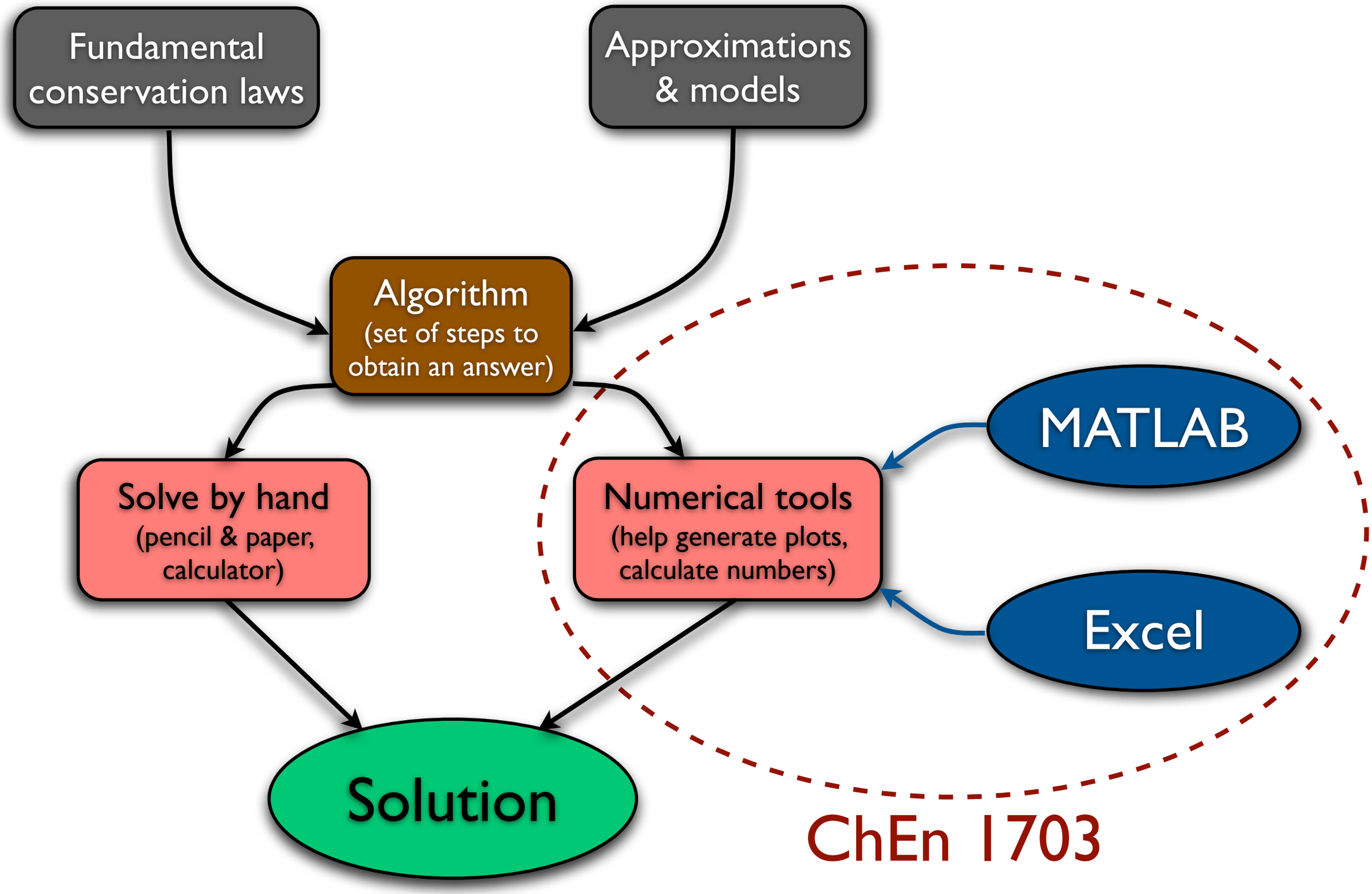
Engineering Approach



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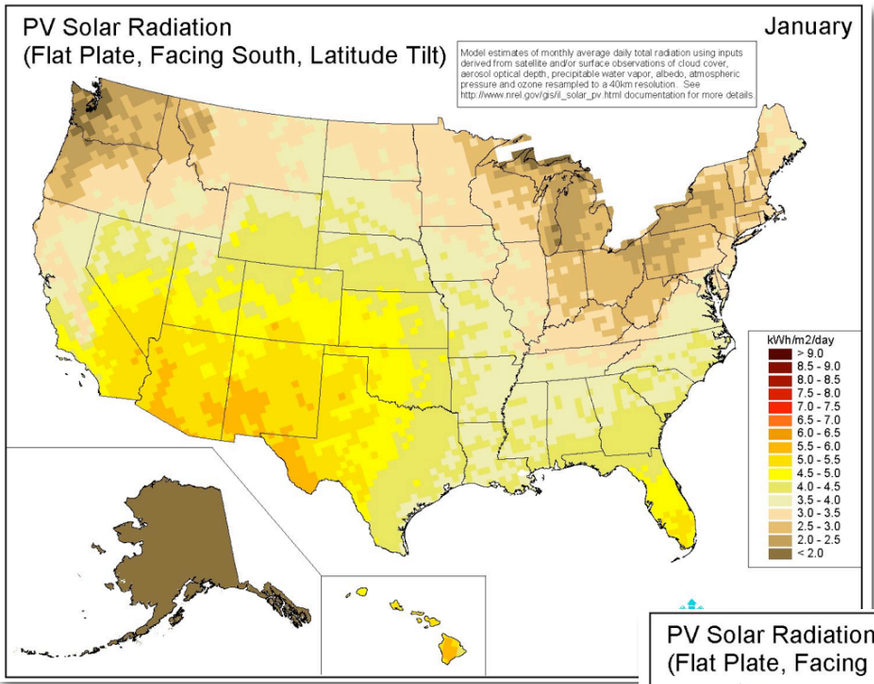
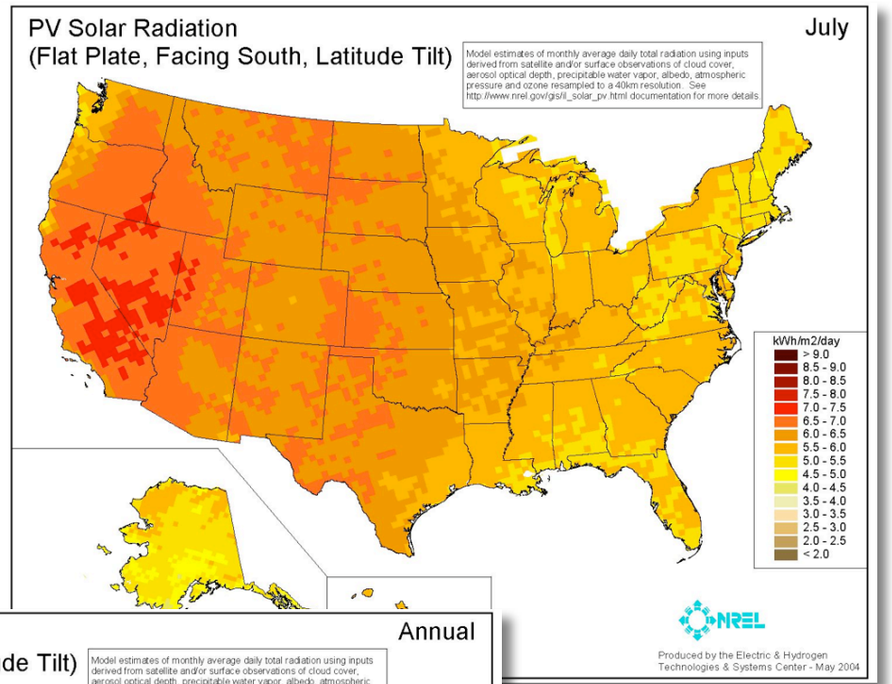
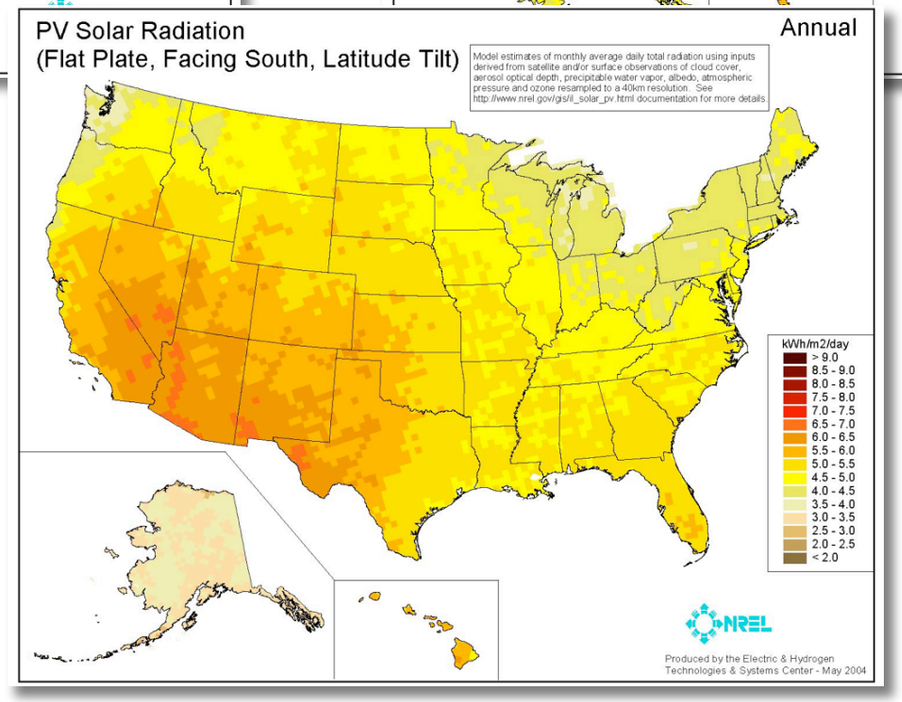
Example

How big must a solar panel be to produce enough electricity to power an average automobile?







http://www.nrel.gov/gis/solar.html

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Example...

How big must a solar panel be to produce enough electricity to power an average automobile?

Variable	Description	Units
E	Average daily energy use for a car	kJ/day
ρ_e	Energy density for gasoline	kJ/gal
MPG	Average mileage for a car	miles/gal
MPD	Average miles driven per day	miles/day
Qs	Energy flux from the sun (averaged over 24 hours)	kJ/(day m^2)
E_{sun}	Energy collected from the sun per day	kJ/day
ε	Efficiency of solar panels and car's electric engine	-
A	Area required for the solar collector	m^2

$$E = \rho_e \cdot \frac{MPD}{MPG} \; [=] \; \frac{\text{J}}{\text{gal}} \frac{\text{miles}}{\text{day}} \frac{\text{gal}}{\text{mile}} \; [=] \; \frac{\text{J}}{\text{day}}$$

$$E_{\text{sun}} = A\,Q_s \; [=] \; \text{m}^2 \; \frac{\text{kJ}}{\text{day} \;\; \text{m}^2} \; [=] \; \text{kJ}$$

$$A = \frac{\rho_e \cdot MPD}{MPG \cdot Q_s}$$

Not all of the incident solar energy is captured and transformed to useful work by the car's engine...

$$\boxed{A = \frac{1}{\varepsilon} \frac{\rho_e \cdot MPD}{MPG \cdot Q_s}}$$

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