

# Computer Integrated Surgery II

600.446/646/452

Spring 2004  
Russell H. Taylor  
Th-Fri 1:00-2:15

# Course concept

- Combination:
  - Lectures on computer-integrated surgery and related subjects by instructor, guests
  - Projects
  - Seminar on current research
- Similar material to 600.445, but with greater depth & implementation focus
- Prerequisite: 600.445 or my consent

# Course Numbers and Credits

- 600.446 (3 credits)
  - Full course (lecture/seminar + project)
  - Advanced undergrads or grad students
- 600.646 (3 credits)
  - Same as 600.446 but intended for grad students doing more advanced projects
- 600.452 (1 credit)
  - Seminar only

# Contact Information

- TA = Xiaofeng Liu (xfliu@cs.jhu.edu)
- Office Hours = Thursday 2:30/4:00
  
- My office hours
  - By appointment (see Jen in NEB 315)
  - Will usually try to be in office 12-1 on class days
  
- My lab meeting is Wed. 1:30-2:45
- ERC Seminars Wed. 12-1:30 (lunch provided)

# Grades

- 600.446/646
  - 25 % seminar presentation/writeup
  - 15 % project plan
  - 10 % project checkpoint presentation
  - 10 % project final presentation (poster presentation)
  - 40 % project implementation & final report
- 600.452
  - Letter grade or Pass/Fail
  - Grade based on seminar presentation & critical summary of pertinent research papers

# Date conflicts

- I will be out of town
  - 3/25-26; 4/22
  - Possibly 3/19, but plan to travel from meeting to be here
  - Possibly other dates later in year
- We need to find make-up dates
  - Pick an evening (e.g., 5-7pm) or dawn (7-8am)
  - Evenings preferred

# Seminar Presentations

- Select a single important paper or series of papers (2-5) relevant to your project or other interest
- Give short (typically, 20 minutes) talk
  - Critical summary of what paper says & its significance
- Bring hard copy of presentation materials to class to be put in your notebook
- Also, write a short (3-5 page) critical review
  - Due day before talk ( give to my secretary for copying and distribution)
  - Will be flexible on due date for the first talks
- Copy of paper will go into your notebook & one to me
- Will be critiqued in class (in a friendly way)

# Typical Outline (modify as appropriate)

- 1 slide statement of your project
- Paper selection and why
- Summary of problem & key result
- Significance of key result
- Necessary background
- Description of what the author(s) actually did
  - Theory, experiment, etc.
- Your assessment
  - Importance, relevance to you, good & bad points, etc.
  - Possible next steps for this work
- Conclusions

# Rough Calendar

- 1/31; 2/5-6: Discuss projects in class
- Pick project & seminar topics by 2/15
- Approved project proposals by 2/22
- Project plan presentations 2/22 through mid march
- Paper seminars March through April
- Project checkpoints mid-March through April
- Project poster session early May
- Project final reports by 5/11 (subject to confirmation)

# Projects

- Typically will involve some substantial implementation/experimentation component
- Require a “mentor”
  - Me, colleague, or an end user
- Require funding/equipment support
  - Can come from me or end user
- Require a defined plan and budget
- Team projects encouraged

# Project Notebooks

- Maintain a loose-leaf notebook with dividers
- One copy for me (keep in my secretary's office); at least one copy for you
- Divide into sections
- Sections for project proposal, all presentations, copies of background material, final report, etc.
- A place for me to keep grade record

# Project Proposals

- Topic by 2/15; “Closed” plan by 2/22 or before
- Approximately 3 page summary containing
  - Stated topic
  - Team members, mentor
  - **Short** statement of relevance/importance
  - List of “deliverables” (min, expected, max)
  - **Short** technical summary of approach
  - Key dates & assigned responsibilities
  - List of dependencies
  - Reading list

# Project Checkpoint Presentation

- Approximately 20 minutes talk
- Given in late March, early April
- Summarize/update plan material
- Present work to date
- Present problems, exposures, dependencies
- Bring hard copy of presentation materials to class to be put in your notebook
- Will be critiqued in class (in a friendly way)

# Project Final Presentation (Poster)

- Near end of semester
- Standard format
- Project should be done or nearly so
- Present/demo results
- Discuss work remaining to be done
- Discuss significance of work
  
- Discuss lessons learned
- Prizes awarded in various categories

# Project Final Report

- Technical summary
  - Similar to a short conference paper
  - Explain background, problem, approach, results, significance, etc.
- Management summary (1 page)
  - Who did what
  - Discuss what was accomplished vs planned
  - Discuss what might be next
- Technical appendices
  - Code, user's manual, etc.

# Possible projects (examples)

- Construction and extension of statistical atlases of bony anatomy (RHT)
- Measure EM tracker distortion in different environments (RHT)
- Evaluation of tool motion in DaVinci using EM tracker (RHT)
- Calibrating (stereo)endoscopes for DaVinci (Hager)
- Stereo vision algorithm implementation & benchmarking (Hager)
- Interactive environment for surgical robots (RHT/kazanzides)
- Cooperative manipulation for robotically-assisted ultrasonography (RHT)
- Stereo visualization & performance tests with DaVinci (Marohn, Hanly)
- Smart sensors for surgical retractors (Talamini)
- iTK-based cartilage segmentation from CT (Armand, RHT)
- iTK-based liver tumor segmentation from CT (Cleary)
- Liver motion analysis under MRI (Cleary)
- RF ablation treatment planning (Cleary, strong possible Choti tie-in)
- Fluoroscopy calibration (Cleary)