First Class - Welcome!

Tim Quigg, Associate Chair and Lecturer
Computer Science Department, UNC-Chapel Hill
Tim’s Background:

- Associate Chair for Administration and Finance, Computer Science Department, University of North Carolina at Chapel Hill (at UNC since 1991) – 5th time teaching this course!

- **Not a Traditional Academic**: Co-founder of two computer software companies; worked for Motorola Computer Systems; CFO of large state agency; PI of large DHEW funded population characteristics study; early grant writer; first white male teacher at NC’s black girl’s state reform school (1st job after undergraduate school at Wake Forest)!
Go Deacs!
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- 39 years managing resources and supervising people in government, private business (large and small) and in academia with an emphasis on research management and technology. Recent consulting clients include NCI, NICHD, European Union and several large universities.
My Metaphor for a Manager:

(Like it or not, as a research-intensive faculty member, you will be a manager one day!)

Catalyst – Just as a catalyst causes a reaction to occur, so too should a manager cause something to occur that would not happen absent the manager!
Departments/Majors Represented:

- Biochemistry and Biophysics
- Bioinformatics and Computational Biology
- Cell and Developmental Biology
- Child Development
- Computer Science
- Gastrointestinal Biology and Disease
- Genetics and Molecular Biology
- Human Movement Science
- Lineberger Cancer Center
- Microbiology and Immunology
- Neurology
- Neuroscience Center
- Nutrition
- Obstetrics and Gynecology
- Pediatrics
- Pharmacy
- Public Health
- Psychiatry
- Surgery
Miscellaneous “Stuff”:

What I Expect from All Students in this Class:

- Come to class! Much of the learning occurs through the presentation and discussion.
- Read all assignments and come prepared to discuss.
- If I use examples, terms or jargon that you don’t understand, stop and ask for clarification. “The only dumb question is the one that isn’t asked!”
- As you think appropriate, provide examples from your experience.
- Actively participate as a member of each of your project groups
- Have fun! Life is too short to do anything else!
Miscellaneous “Stuff”:

- If you are taking this course to meet requirements for the Graduate Certificate in Entrepreneurship or if you wish to complete a full proposal for submission to a funding agency or if you wish to explore a topic in substantial detail, register for 2 hours of Comp 790-083. (see me after class).

- If you are an auditor, I strongly suggest that you do the readings and the budget assignments. Much of the material (e.g., budgeting) is really learned “by doing”!

- Also for auditors, I will ask you in a couple of weeks if you wish to be assigned to a group for the case studies.
Miscellaneous “Stuff”:

- All slides, readings, and assignments will be on my website [http://www.cs.unc.edu/~quigg/](http://www.cs.unc.edu/~quigg/) under teaching.

- Grading:
  - H+ 96-100
  - H 91-95
  - H- 86-90
  - P+ 81-85
  - P 76-80
  - P- 70-75
  - L 60-69
  - F 0-59
Overview: This course covers a range of topics important to any doctoral student in the sciences—topics that are rarely covered in other courses. Students will learn the basics of writing grant applications and preparing budgets, how the proposal review process works different agencies, and important aspects of managing research after the proposal is funded, e.g., supervising people as well as managing money, scheduling work, and documenting performance while complying with funding agency rules. Additional topics include: setting up a lab; research ethics; misconduct in science; human subject testing; laboratory safety; intellectual property including copyrights, patents, trademarks and trade secrets; technology transfer including licensing, material transfers, and start-up companies; conflict of interest and the challenges/rewards of bridging the academic/industry divide.

Time and Location: Tuesday/Thursday from 12:30 to 1:45 in Sitterson SN011

Instructor: Tim Quigg, Associate Chair and Lecturer, Department of Computer Science

Text: There is no text book for this course; however, there will be a series of assigned readings accessible from the instructor’s web page.

Related Course: Those students taking Comp 918 as an elective for the Graduate Certificate in Entrepreneurship, those interested in writing a full proposal for submission to a funding agency, and those with a desire to explore a particular research administration topic in more detail, should also register for 2 hours of COMP 790-083 (Special Topics in Research Administration).

Auditors and Guests: Post-docs, junior faculty and research staff are welcome to “informally audit” the class (with instructor permission). Graduate students are expected to register for the class or “formally audit”. However, anyone is welcome to sit in on particular lectures of interest.

Course Projects and Grades: Students will complete 2 budgeting exercises (20% of grade); three group case studies - management (10%), research ethics (10%) and intellectual property (10%); and a final two-part course project consisting of a mini-grant proposal (35%) and peer review of the other group mini-grant proposals (15%). The budget exercises are completed by each student individually; all other projects are done in small groups. The case study groups are assigned by the instructor and the final course project groups are student selected. Group mini-grant proposals are due April 13 and group Peer Review of other mini-grant proposals are due April 20! Class presentations are scheduled for April 22 and 27, 2010.
• Tuesday, January 12, 2010  
  **Introduction and History of Research Funding in U.S.**
  **Reading Assignment:** Endless Frontier Final Report

• Thursday, January 14, 2010  
  **Overview of Federal Budgeting Process, Federal and Non-federal Expenditures for Research, and UNC-Chapel Hill Research Funding**
  **Reading Assignments:**
  1. *The Art of Grantsmanship* by Jacob Kraicer
  2. *Advice on Writing Proposals to the NSF* by Susan Finger

• Tuesday, January 19, 2010  
  **The Art of Grantsmanship**

• Thursday, January 21, 2010  
  **Contracts/Grants/Cooperative Agreements What's the Difference?**
  **Reading Assignment:** Review OMB Circular A-21

• Tuesday, January 26, 2010  
  **OMB Circular A-21 (Cost Principles) – Allowable/Unallowable, Direct/Indirect costs, Introduction to Budgeting**

• Thursday, January 28, 2010  
  **OMB Circular A-21 (continued) –**
  **Reading Assignment:** Review OMB Circular A-110
  **Project:** By 5:00 PM Tuesday, February 2, submit via email first budget assignment

• Tuesday, February 2, 2010  
  **OMB Circular A-110 (Administrative Requirements) Program Income, Budget Revisions, Expanded Authority, Equipment, Termination/Closeout, Cost Sharing, Recharge/Service Centers**

• Thursday, February 4, 2010  
  **OMB Circular A-110 (continued), FAR and Review of Budget Assignments**
  **Project:** By 5:00 PM Tuesday, February 9 submit via email second budget assignment

• Tuesday, February 9, 2010  
  **Guest Lecture: Peg Vigiolto, Associate Vice Chancellor for Research and Director, Office of Sponsored Research**
  “Electronic Proposal Processing – Grants.gov and UNC Initiatives”
  **Reading Assignment:** – Chapter 26 in Research Administration and Management text entitled “Special Issues of Departmental Administration” by Tim Quigg
Thursday, February 11, 2010
Sponsored Research Administration at Department/Lab Level: Setting-up a Lab, Effective Time Management

*Reading Assignment: Report of UNC Sponsored Programs Study Committee by Tim Quigg*

Thursday, February 18, 2010
Supervising People in an Academic Setting (Basic Tasks of Supervision, Failure Tolerant Organizations, Team Building, Managing Around Weaknesses, Managing Your Boss)

*Project: Review the MacGregor Case Study, meet with group to discuss study questions and prepare class presentation for Thursday, February 25*

Tuesday, February 23, 2010
Supervising People in Academic Settings (Efficiency and Effectiveness, Sub-Unit Optimization, Goal Setting, Delegation, Dealing with Difficulty Employees, Negotiation Skills)

Thursday, February 25, 2010
Management (McGregor) Case Study!

Tuesday, March 2, 2010

Thursday, March 4, 2010
*Guest Lecture: James Gilbert Safety Officer for Laboratory and Chemical Safety “Lab Safety Issues”*

Tuesday, March 9, 2010
*Spring Break – No Class!*

Tuesday, March 16, 2010
Research Ethics: Misconduct in Science (Fabrication, Falsification, Plagiarism); Authorship; Peer Review, Data Ownership

*Project: Review the “Only A Bridge” Case Study, meet with group to discuss study questions and prepare class presentation for Tuesday, March 18*

Tuesday March 18, 2010
Research Ethics (Only A Bridge) Case Study!

Tuesday, March 23, 2010
Intro. to Intellectual Property: Patents

*Reading Assignment: 1. Chapter 9 in Patent It Yourself by David Pressman 2. Pitfalls and Traps in Claim Drafting by Brown and Mich:

- Tuesday, March 30, 2010  Writing Patent Claims: Understanding Infringement/Invalidation
  
  **Project:** Review the BioMax Case Study, meet with group to discuss study questions and prepare class presentation for Thursday, April 8

- Thursday, April 1, 2010  Copyrights: Legal Protection and Fair Use; Trade Marks and Trade Secrets
  
  **Reading Assignment:** Primer on Copyright Liability and Fair Use by the Citizen Media Law Project

- Tuesday, April 6, 2010  Copyrights: Legal Protection and Fair Use; Trade Marks and Trade Secrets

- Thursday, April 8, 2010  Intellectual Property (BioMax) Case Study!
  
  **Reading Assignment:** Review IP Agreements for next class

- Tuesday, April 13, 2010  **Guest Lecture:** Trude Amick, Assistant Director, Office of Technology Development
  
  "Working with Industry: NDA's, MTA's and Licensees"
  
  **Project:** Group Grant proposals due by 5:00 PM April 13!

- Thursday, April 15, 2010  Conflict of Interest Issues – Working with Industry brings both Rewards and New Challenges

- Tuesday, April 20, 2010  Bringing It All Together!
  
  **Project:** Group Peer Review of Grant proposals due by 5:00 PM April 20!

- Thursday, April 22, 2010  Final Group Project Presentations!

- Tuesday, April 27, 2010  Final Group Project Presentations!
Research Administration for Scientists

COMP 918

History of Research Funding in the U.S.

Tim Quigg, Associate Chair and Lecturer
Computer Science Department, UNC-Chapel Hill
When did the federal government become involved in funding university research?
History: External Support for University Research in U.S.

- WWII was the dividing line, before it most university research was funded from:
  - Internal sources
  - Notable exception – Agriculture!
  - Morrill Act of 1862: Land-Grant Colleges
    - 30,000 acres of federal land/congressional representative to each State
Land was to be sold to provide a perpetual endowment fund for:

“at least one college where the leading object shall be, without excluding other scientific and classical studies and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts…”

University of Kentucky (50¢/acre) – Cornell University ($5.50/acre)
Second Morrill Act of 1890

- In order to get federal $, State had to show that race was not a criterion for admission to land-grant institution or
- Designate a separate land-grant college for blacks
- “1890 land-grants” created all over the then-segregated South
Place your mouse pointer over a location dot link in each state and click to go to that State 1890 University.
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A New Concept: Matching Funds (Cost Share)

- Hatch Act of 1887: Agriculture Experiment Station
  - Annual appropriation – *State match required*

- Smith-Lever Act of 1914: Cooperative Extension Service
  - Annual appropriation – *State match required*
WWII Changed it All!

**Challenge** – How to mobilize University scientists to apply their expertise to war effort?

- Council of National Defense started by Woodrow Wilson in 1916 was suspended after WWI
- National Defense Research Council - formed by FDR in June, 1940
  - Forum for bringing university/industry/government scientists together
  - 18 month “head-start” on Pearl Harbor (12-7-41)
Office of Scientific Research and Defense (OSRD)

Headed by Dr. Vannevar Bush – reported to FDR!

- May 1941 to December 1947
- Civilian, not military control
- Highly centralized structure
- Mission “to explore a possible government role to encourage future scientific progress.”
- Authority to contract work!
New Concept: Contracting Work to Both Industry and Universities!

- Carnegie Institute of Technology – Large Rocket Lab
- MIT – Radiation Lab
- Western Electric and Bell Labs – Sound Amplification

Emphasis on both vertical integration of methodology (from fundamental science to production) and on concentrated, massive rapid development/deployment

Example – Japanese torpedo jammer was developed from production prototype to field use in one week!
Three Critical Secret Projects Pivotal to Allied Victory!

What were they?

- Atomic bomb (Manhattan project)
- Radar
  - 1935 – NRL – ship radar
  - 1942 – MIT – high-frequency, narrow-beam, high-resolution
  - Manufactured by Sperry, Westinghouse, Philco (for aircraft)
Proximity or Variable Time Fuse!

What new “machines of war” were widely used on both sides in WWII?

Airplanes!

- Prior to WWII – timed fuze or contact fuze
- Neither effective against highly maneuverable airplanes
- Section T – Applied Physics Lab at Johns Hopkins University assigned task of developing proximity fuze for Navy’s 5” guns
How Did the Proximity Fuse Work?

- **Theory**
  - Fuze contains miniature radio transmitter-receiver
  - Sends out signal
  - When signal reflected back from target reaches a certain frequency (caused by proximity to target) a circuit closes firing a small charge which detonates projectile
Problems:

- Components – tiny glass vacuum tubes
- Force of 20,000 g’s when fired (2800 ft./sec. muzzle velocity)
- 25,000 revolutions/minute through rifling grooves
- Moisture
- Self-destruct feature for dudes
Importance to War Effort:

- James V. Forrestal, Secretary of the Navy said, “The proximity fuze has helped me blaze the trail to Japan. Without the protection this ingenious device has given the surface ships of the fleet, our westward push could not have been so swift and the cost in men and ships would have been immeasurably greater”

- Prime Minister, Winston S. Churchill was quoted with “These so-called proximity fuzes, made in the United States..., proved potent against the small unmanned aircraft (V-1) with which we were assailed in 1944.”

- And Commanding General of the Third Army, George S. Patton said, “The funny fuze won the Battle of the Bulge for us. I think that when all armies get this shell we will have to devise some new method of warfare.”
Why do I Tell This Story?

- Unlike wars since WWII, the U.S.’s independence was in doubt!
- America had a fascination with science and technology
- It helped win the war!
- University research was held in high regard.
- The public was ready to spend tax dollars to invest in research in general and university research in particular!
Bush’s final report:

**The Endless Frontier:** Enumerated two principles for expanding R&D in U.S. Universities:

1. Federal government should be a **patron** of science

2. Government support should ensure a **free rein of investigation** by scientists into topics and methods of their choice
This report lead in 1950 to the establishment of the National Science Foundation (NSF)!

- Independent government agency
- National Science Board
  - 24 members plus director
  - Appointed by President
NIH’s History of Funding University Research:

- 1798 – Marine Hospital Service established to provide medical care for merchant seaman

- 1891 – Hygienic Laboratory established in Washington, DC with 1 employee working on “bacteriology”

- 1901 – Congress appropriated $35K for construction of a new building for Lab to investigate “infectious and contagious diseases and matters pertaining to the public health”

- 1904 – the Lab was reorganized as the “Public Health and Marine Hospital Service” with 3 Divisions (Chemistry, Pharmacology and Zoology)
Brief History of NIH:

- WWI – PHS primary mission – sanitation of areas around military bases

- 1930 – Ransdell Act changed name of the Hygienic Laboratory to the National Institute (singular) of Health and authorized establishment of fellowships for research into “basic biological and medical problems” – amazing to be enacted during the Great Depression!

- 1937 – Congress created the National Cancer Institute with every Senator voting in favor. This revealed growing concern with cancer and was the beginning of the “categorical-disease structure” of NIH. **NCI was authorized to award grants to nonfederal employee scientists!**
Beginning of “Extramural Research” Program:

- WWII – focus was on war-related problems: research on hazardous substances and ways to protect workers in war industries; development of vaccines and therapies to address tropical diseases (yellow fever and typhus); discovery that sodium deficiency was a leading cause of death after burns which led to the use of saline therapy on the battlefield; determination of optimal altitude for administering oxygen to pilots to prevent “blackouts”; and much more! Some of this work was conducted through grants from NCI to universities!

- 1944 – NCI was specifically designated as a component of NIH (Note: only two officers of NIH are direct Presidential appointments: the Directors of NIH and NCI)
Expansion of “Extramural Research” Program to all of NIH:

- 1946 – Public Health Act expanded the successful grants program at NCI to all of NIH

- 1946 - 1949 – New Institutes created for mental health, dental disease and heart disease. By 1960 there were 10 Institutes, by 1970 there were 15 and by 2000 there were 27 Institutes and Centers
DoD’s Major Funding Agencies:

- **DARPA** – Established in 1958 in response to the launching by the Soviet Union of Sputnik, the Defense Advanced Research Projects Administration is the main research and development office for the U.S. Department of Defense. It’s mission is to “maintain technological superiority of the U.S. military and prevent technological surprise from harming our national security”.

- **ARO** – The Army’s “premier extramural basic research agency in the engineering, physical, information and life sciences; developing and exploiting innovative advances to ensure the Nation’s technological superiority”.
DoD’s Major Funding Agencies:

- **ONR** – The Navy established its first Naval Research Lab (NRL) in 1923. In 1946, President Truman signed legislation establishing the Office of Naval Research (ONR) to “plan, foster and encourage scientific research in recognition of its paramount importance as related to the maintenance of future naval power and the preservation of national security”.

- **AFOSR** – The Air Force Office of Scientific Research, beginning in 1948 as the Office of Air Research at Wright Field in Ohio, grew dramatically after the launch of the Sputnik by the Soviet Union. It’s mission is to “support Air Force goals of control and maximum utilization of air, space and cyberspace”.

Observations on DoD Funding of University Research:

- Preference for contracts over grants!

- Importance of “deliverables” in contracts.

- Often, universities work as subcontractors to large defense contractors (we do the basic science and let the company worry about the deliverables).

- Many basic science awards from DoD agencies also have significant civilian applications!
Conclusions/Observations:

- Since WWII, the federal government has become the primary source for funding university research!

- Many universities (including UNC) receive more money from competitively awarded research contracts/grants than from any other source.

- Many questions arise: governance (faculty bring in more money than the state provides), academic freedom (are faculty pursuing knowledge or just “chasing available money”), institutional priorities (teaching versus research), and conflict of interest as faculty work more closely with industry!