



**Human-Computer Interaction Institute (HCII)**

**Professional Masters of Educational  
Technology and Applied Learning Science  
(METALS)**

**2016-2017 Handbook**



**METALS**

Masters of Educational Technology  
& Applied Learning Science

**August 22, 2016**

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*Welcome to the Carnegie Mellon community! And congratulations again on being accepted to one of the world's best universities. What our founder, Andrew Carnegie, said over 100 years ago "My heart is in the work." still rings true today at Carnegie Mellon.*

*While this handbook is specific to your academic experience in the METALS program, there are several other resources and offices graduate students are encouraged to consult during their tenure at Carnegie Mellon University. Information about The Word, the student handbook, the Office of the Assistant Vice Provost for Graduate Education, the Office of the Dean of Student Affairs and others are included in Appendix A of this handbook.*

### **Carnegie Mellon University Statement of Assurance**

Carnegie Mellon University does not discriminate in admission, employment, or administration of its programs or activities on the basis of race, color, national origin, sex, handicap or disability, age, sexual orientation, gender identity, religion, creed, ancestry, belief, veteran status, or genetic information. Furthermore, Carnegie Mellon University does not discriminate and is required not to discriminate in violation of federal, state, or local laws or executive orders.

Inquiries concerning the application of and compliance with this statement should be directed to the vice president for campus affairs, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, telephone 412-268-2056.

Obtain general information about Carnegie Mellon University by calling 412-268-2000.

The Statement of Assurance can also be found on-line at:

<http://www.cmu.edu/policies/documents/SoA.html>.

## HCII Mission

The Human-Computer Interaction Institute (HCII) is an interdisciplinary community of students and faculty at Carnegie Mellon University. The HCII's mission is to understand and create technology that harmonizes with and improves human capabilities, goals, and social environments, through interdisciplinary research and education joining design, computer science, and behavioral and social sciences.

While the HCII is headquartered within the School of Computer Science, members of the HCII community represent a broad spectrum of the Carnegie Mellon University campus including the College of Humanities and Social Sciences, Graduate School of Industrial Administration, College of Fine Arts, Tepper School of Business, Carnegie Institute of Technology, as well as the School of Computer Science. Collaborators and sponsors come from other universities in Pittsburgh and around the world, and a range of industry partners from small startup companies to multi-national corporations.

## History of the HCII

The idea for a Human-Computer Interaction Institute at CMU can be traced back to 1967, and to the very origins of the computer science program here. Founders Allen Newell, Herbert A. Simon, and Alan J. Perlis – an interdisciplinary team if ever there was one – believed that the new discipline of computer science should include the study of phenomena surrounding computers, not just the theory and design of computation devices themselves (Letter to Science, vol. 157, no. 3795, 9/22/67, pp. 1373-1374).

In 1985, Bonnie John (still a graduate student at the time!) opened the first user studies laboratories for faculty and student use. Originally built to observe and record individual users of the ZOG system (an early hypermedia system), the labs are now used for training in usability analysis and for carrying out a large range of studies in human-computer interaction. In 1993, Bonnie John offered the first CMU course in Human-Computer Interaction. Soon after, a committee drawing on faculty across the campus founded the Institute.

By 2000, the CMU faculty/staff directory listed over 60 faculty, staff, and postdoctoral researchers affiliated with the HCII. HCII research and educational programs span a full cycle of knowledge creation. The cycle includes research on how people work, play, and communicate within groups, organizations, and social structures. It includes the design, creation, and evaluation of technologies and tools to support human and social activities. The HCII has a record of evaluating and monitoring the immediate and longer-term usability and social aspects of new technologies and tools. This work informs new technologies and tools.

## Research at the HCII

Research carried out at the HCII addresses all of the areas in which people live and work, communicate and collaborate, learn and change with and through technology. Some examples are user-interface software tools, cognitive models, dialogue systems, data visualization, gesture recognition, intelligent agents, visual interface design, human-robot interaction, computer-supported cooperative work, computer music and drama, intelligent tutors, technical writing, assistive technologies, and the organizational and social impact of technology. Our

methodologies are as varied as the research we carry out. HCII faculty and students are often solicited as collaborators, by academia and industry. Our industry alliances range from an individual company working with a small group of students to multi-company consortia seeking multi-national solutions.

## Academic Programs

The Human-Computer Interaction Institute (HCII) at Carnegie Mellon University is pleased to offer multidisciplinary undergraduate and graduate educational programs that emphasize understanding, implementing and evaluating technologies for the benefit of people and society.

METALS is a one-year, interdisciplinary Masters program that trains graduate students to apply evidence-based research in learning to create effective instruction and educational technologies within formal and informal settings such as schools, workplaces, and museums. The professional program culminates with a seven-month capstone project for an external client. Guided by industry and faculty mentors in this team-based research and development project, students experience the end-to-end process of a product cycle from idea through prototyping.

## METALS Program Overview

METALS is an intense, interdisciplinary program that condenses a normal two-year graduate program into twelve months. The program is taught jointly by leading experts in the [Human-Computer Interaction Institute](#) and the [Department of Psychology](#) at Carnegie Mellon. METALS is also part of the recently announced [Simon Initiative](#).

The first and second semesters in the METALS program focus on mastering core knowledge and skills through courses in learning principles, technology design and implementation, and a range of engaging electives. The second semester introduces the student [Capstone Project](#), a substantial industry project with an external client. The third and final semester over the summer focuses on Capstone Project exclusively.

This program is distinct from both Master of Human Computer Interaction (MHCI) and the Learning Sciences track in the HCII PhD program and is not designed as a feeder to that program.

## Program Goals

Graduates of the METALS program are trained to design, develop, and implement advanced solutions, making sense of state-of-the-art technologies and methods such as:

- Artificial Intelligence
- Machine Learning
- Language Technologies
- Intelligent Tutoring Systems
- Educational Data Mining
- Tangible Interfaces

Upon completion of the METALS program, graduates:

- Understand how these technologies can be applied to engineer and implement innovative and effective educational solutions.
- Understand cognitive and social psychology principles relevant to research-informed instructional design.
- Possess the instructional and interaction design skills needed to create solutions that not only enhance learning, but are also desirable.
- Understand the role of and have skills in using psychometric and educational data mining methods in evaluating and improving educational solutions.
- Develop continual improvement programs that employ *in vivo* experiments and educational data mining to reliably identify best practices and opportunities for change.

## Program History

The curriculum is an outgrowth of the extensive research conducted by the National Science Foundation's Science of Learning Center, [LearnLab](#), in which more than 200 researchers produced more than 1,900 publications and talks as well as over 350 classroom studies. Our partners have employed our research at several companies including [Kaplan](#), [LightSide Labs](#), [Mathify](#), [Acrobatiq](#), Carnegie Learning and others.

Carnegie Mellon is known by the software and technical industries for its interdisciplinary nature, rigor and deep knowledge in learning science, human-computer interaction, psychology, design and computer science.

## Contact Information

### *METALS Program*

- Ken Koedinger, METALS Faculty Director, [koedinger@cmu.edu](mailto:koedinger@cmu.edu), NSH 3601, 412-268-7667
- Michael Bett, METALS Managing Director, [mbett@cs.cmu.edu](mailto:mbett@cs.cmu.edu), NSH 2602F 412-268-8616
- Lauren Hardwig, METALS Coordinator, [lhardwig@cs.cmu.edu](mailto:lhardwig@cs.cmu.edu), NSH 3526, 412-268-1638

### *HCI Administrative*

- Anind Dey, HCI Director, [anind@cs.cmu.edu](mailto:anind@cs.cmu.edu), NSH 3519
- Jessica Stanley, Manager of the Director's Office, [stanleyj@cs.cmu.edu](mailto:stanleyj@cs.cmu.edu), NSH 3521 412-268-4691

### *School of Computer Science*

- Andrew Moore, Dean, [awm@andrew.cmu.edu](mailto:awm@andrew.cmu.edu), GHC 5113
- Garth Gibson, Associate Dean for Master's Programs, [garth@cmu.edu](mailto:garth@cmu.edu), (412)268-5890

### *METALS Mailing Address*

HCI / METALS  
 School of Computer Science  
 Carnegie Mellon University  
 5000 Forbes Avenue  
 Pittsburgh, PA 15213

## Graduate Student Concerns & Grievances

Graduate students are encouraged to discuss any concerns or grievances initially with the faculty or staff member(s) involved. If no resolution is obtained, students are expected to seek informal resolution of grievances through consultations within the academic unit, department or program (including the academic advisor, program director and/or department head). Students may also seek assistance with the informal resolution of a grievance through the designated college ombudsperson or the Assistant Vice Provost for Graduate Education.

If a grievance cannot be resolved informally with the faculty or staff member, or through consultation with the program director or department head, students should follow the Computer Science grievance policy and procedure: <http://www.cmu.edu/policies/StudentPolicy.html>. All points laid out in this handbook follow the policies of the School of Computer Science (SCS) and/or university policies, as defined on the official CMU Policies website (<http://www.cmu.edu/policies/>).

Additionally, students may confer with the university graduate student ombudsman, Suzie Laurich-McIntyre, [slaurichmcintyre@cmu.edu](mailto:slaurichmcintyre@cmu.edu), on issues of process or other concerns as they navigate conflicts. Suzie Laurich-McIntyre is the Assistant Vice Provost for Graduate Education.

## METALS Degree Requirements

The general grading policy is described on the [university grading policy page](#).

Students earn a letter grade (A, A-, B+, B, B-, C+, C, C-, D+, D, or R) for each course taken. Pass/fail grades are not permitted for courses used to satisfy METALS course requirements, nor are S grades. Neither are counted toward degree requirements.

**Course work must receive a grade of B- or better to be acceptable toward graduate degree requirements.**

The METALS program requires a minimum of 153 units. The average grade of 153 units applied to the degree shall be at least B, and the student may choose any 153 units satisfying the degree requirements to compute the grade average.

### *The Curriculum*

All students are required to take the following six core courses ([05-823](#), 85-738, [05-840](#), [05-392](#), [05-681](#) and [05-682](#)) and to choose five electives from the list below.

#### *Core Courses:*

[05-823](#) E-Learning Design Principles

This course is about e-learning design principles, the evidence and theory behind them, and how to apply these principles to develop effective educational technologies. It is organized around the book *E-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning* by Clark & Mayer with further readings drawn from cognitive science, educational psychology, and human-computer interaction. You will learn design principles 1) for combining words, audio, and graphics



in multimedia instruction, 2) for combining examples, explanations, practice and feedback in online support for learning by doing, and 3) for balancing learner versus system control and supporting student metacognition. You will read about the experiments that support these design principles, see examples of how to design such experiments, and practice applying the principles in educational technology development.

#### 85-738 Educational Goals, Instruction and Assessment

Students will learn to use scientifically based principles and practical strategies for:

1. developing learner models and educational goals based on detailed task analysis of the knowledge, skills, and dispositions required for understanding and mastery,
2. aligning the instructional program and its valid assessment with learners and goals, and
3. considering additional aspects of learning environments that may impact implementation and evaluation.

#### [05-840](#) Tools for Online Learning

In this course, we will explore issues that pertain to interaction and interface design. The class will focus on elements of the larger interaction design process including basic design principles, information architecture and navigation, planning and brainstorming methods, and techniques for developing rapid sketches and prototypes. Course Requirements: This class will not focus on learning specific software tools. Students are expected to have prior experience using a variety of design and programming tools. Please speak with the instructor if you have questions regarding these prerequisites.

#### [05-392](#) Interaction Design Overview

In this course, the fundamentals of communication and interaction design including layout, typography, color, sketching, storyboarding, and the use of images are presented. Students will become proficient with these skills, and will become comfortable engaging in studio critique, a critical discussion of the strengths and weaknesses of a given design. Course assignments will take the form of several short exercises.

#### [05-681](#) METALS Project I (15-unit spring course)

#### [05-682](#) METALS Project II (48-unit summer course)

Experiential learning is key component of the METALS program. Through a substantial team project, students apply classroom knowledge in analysis and evaluation, implementation and design, and develop skills working in multidisciplinary teams. The project begins in the spring semester before graduation and continues full-time through

the final summer semester; it must be taken in consecutive spring and summer semesters. The course number for spring is 05-681 and for summer 05-682.

**Five Electives**

You may use the five elective courses to design the program to your individual interests, background and goals. You must choose a minimum of three electives from at least two of the three subject areas (Technology, Learning Sciences Theory & Instructional Design, Methods & Design). Electives may be cross-listed, but can only count in one subject area.

Each elective course must be the equivalent of a full-semester (9 or 12 unit) course; two mini (half-semester) courses (6 units each) count as one elective. Elective courses must be different from any that you may have taken as part of the METALS core, and they cannot have counted toward a degree previously awarded by CMU.

Electives must be individually approved by the METALS Director, on a case-by-case basis for each student to realize their program goals and future endeavors.

<p>Technology <i>Choose one:</i></p> <ul style="list-style-type: none"> <li>• Personalized Online Learning (<a href="#">05-832</a>)</li> <li>• Design of Educational Games (<a href="#">05-818</a>)</li> <li>• Computer-Supported Collaborative Learning (<a href="#">05-899 E</a>)</li> <li>• Applied Machine Learning (<a href="#">05-834</a>)</li> <li>• Machine Learning (<a href="#">10-601</a>, <a href="#">10-701</a>)</li> <li>• Computational Models of Discourse Analysis (<a href="#">11-719</a>)</li> <li>• Design &amp; Engineering of Intelligent Information Systems (11-791)</li> <li>• Role of Technology in Learning in the 21st Century (<a href="#">05-838</a>)</li> <li>• The Big Data Pipeline (<a href="#">05-839</a>)</li> <li>• Mobile Service Innovation (<a href="#">05-899 B</a>)</li> </ul> <p>Learning Sciences Theory &amp; Instructional Design</p> <p><i>Choose one:</i></p>	<p>Methods &amp; Design <i>Choose one:</i></p> <ul style="list-style-type: none"> <li>• Human Factors (<a href="#">05-813</a>)</li> <li>• Game Design Workshop</li> <li>• Stats: Experimental Design for Behavioral and Social Sciences (36-749)</li> <li>• Research Methods for the Learning Sciences (85-748)</li> <li>• Design of Educational Games (<a href="#">05-818</a>)</li> <li>• Service Design (<a href="#">05-898A</a>)</li> <li>• Social Perspectives in HCI (<a href="#">05-772</a>) / Computer Science Perspectives In HCI (<a href="#">05-773</a>)</li> <li>• Research Methods in Human Centered Design (<a href="#">51-744</a>)</li> </ul> <p>General Electives</p> <p><i>Any two additional courses above or choose two from the list below:</i></p>
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<ul style="list-style-type: none"> <li>• Learning and Motivation (05-899)</li> <li>• Cognitive Development (<a href="#">85-423</a>, 85-723)</li> <li>• Human Expertise (<a href="#">85-392</a>, 85-792)</li> <li>• Applications of Cognitive Science (85-795,<a href="#">05-795</a>)</li> <li>• Scientific Research in Education (85-436)</li> </ul>	<ul style="list-style-type: none"> <li>• Computer Mediated Communication (05-817)</li> <li>• Social Web (<a href="#">05-820</a>)</li> <li>• Ubiquitous Computing (<a href="#">05-837</a>)</li> <li>• Computer-Assisted Language Learning (11-717)</li> <li>• Inventing the Future of Services (11-794)</li> <li>• Analysis of Social Media (11-772)</li> <li>• Evidence-Based Management (94-814)</li> <li>• Language Acquisition and Technology (82-888 C)</li> <li>• Sensemaking: Cognitive, Social, and Technical Perspectives (<a href="#">05-899 A</a>)</li> <li>• Crowd Programming (<a href="#">05-899 C</a>)</li> <li>• Entrepreneurship (cross listed with ECE) (05-899 D)</li> <li>• Designing for Service (51-785)</li> <li>• Methodology of Visualization (51-831)</li> <li>• Web Accessibility (<a href="#">05-897</a>)</li> <li>• Gadgets, Sensors and Activity Recognition in HCI (<a href="#">05-833</a>)</li> <li>• Machine Learning Text Mining (11-741)</li> <li>• Advanced Web Design (51-828)</li> <li>• Designing Human Centered Software (<a href="#">05-891</a>)</li> <li>• Language and Statistics (11-761)</li> <li>• Decision Making Under Uncertainty (95-760)</li> <li>• Other possibilities if approved by METALS Director</li> </ul>
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**Two Place-out Courses**

Carnegie Mellon’s METALS is a rigorous interdisciplinary program. Every student arrives here with his or her own set of talents and skills and we would like to reward you for your prior hard work by giving you the opportunity to “place-out” of several of the required courses.

We advise students to take advantage of this opportunity as it will give you more time to take electives, independent studies or various other courses that you may find of interest. If you choose not to take advantage of these place-out opportunities, then we cannot guarantee the completion of the program in 12 months.

- Knowledge of Programming  
Proficiency in a programming language such as C, programming methodology and style, problem analysis, program structure, algorithm analysis, data abstraction, and dynamic data. Normally met through an introductory course in programming in C, C++, Pascal or JAVA, that requires the student to write programs of about 300-lines of code from scratch. Equivalent course at CMU is 15-100 Introductory/Intermediate Programming.
- Knowledge of Statistics  
Basic concepts, logic, and issues involved in statistical reasoning, such as probability theory, methods for statistical inference, introductory research methods, exploratory data analysis, and the use of some statistical tests in the regression analysis and the contingency table families. Equivalent courses at CMU are 36-220 Engineering Statistics and Quality Control and 36-202 Statistical Methods.

**Sample Plans of Study**

*Full-time Study:* The METALS degree is designed to be earned in three semesters over the course of one year from August to August. Here is a sample full-time schedule:

Fall	Spring	Summer
<a href="#">05-823</a> E-Learning Design Principles 85-738 Educational Goals, Instruction and Assessment <a href="#">05-840</a> Tools for Online Learning <a href="#">05-392</a> Interaction Design Overview Elective 1	<a href="#">05-681</a> METALS Project I Elective 2 Elective 3 Elective 4 Elective 5	<a href="#">05-682</a> METALS Project II

*Part Time Study:* Students have the option to complete the program on a part-time basis. By exercising this option, you will be able to tailor completion of the coursework to suit your needs. You will work with an advisor to set up an appropriate plan of study. Ideally students should be able to complete the degree within a period of two years by taking two courses per semester, including summers. During the summer METALS Project II course, students are expected to be enrolled as full-time students, and should make the appropriate arrangements with their employers for leave. Part-time students must also be aware that all HCI core courses are held during the day, so it is not possible to complete the degree as a night student. Also we cannot guarantee that all electives will be available during the summer.

The following is a sample part-time plan of study that keeps in mind required course sequences.

First Fall	First Spring	First Summer
<b>85-738</b> Educational Goals, Instruction and Assessment <b>05-823</b> E-Learning Design Principles	Elective 1 Elective 2	Elective 3 Elective 4
Second Fall	Second Spring	Second Summer
<b>05-392</b> Interaction Design Overview <b>05-840</b> Tools for Online Learning	Elective 5 <b>05-681</b> METALS Project I	<b>05-682</b> METALS Project II

### Independent Study

Independent Study courses are designed to provide students with an opportunity for intensive study of a subject that is either unavailable or insufficiently covered in regular course work. Independent/Directed study is not intended to substitute for existing courses, but to provide the opportunity for a specialized educational and research experience.

Who can Supervise? Any METALS faculty member is eligible to serve as the supervisor of an Independent Study course or project. The student must provide a brief prospectus of the project to the faculty supervisor as a basis for an agreement on the objectives of the course.

To Receive Approval. Students arranging Independent Study or Directed Study programs must:

1. Receive approval from their advisor before electing the course.
2. Draw up a contract with the supervising faculty member that describes in detail the course and its requirements. Submit the form to Michael Bett for processing.

**Restrictions:** METALS students may elect the lesser of up to a total of 24 units or two courses of Independent Study towards their degrees.

Transfer Courses & PCHE [www.cmu.edu/policies/documents/TransferCredit.html](http://www.cmu.edu/policies/documents/TransferCredit.html)

Carnegie Mellon University offers students the opportunity to take courses for credit through a cross-registration program (see Pittsburgh Council on Higher Education (PCHE) and Cross-registration below) and through the receipt of transfer credit from other accredited institutions. The Carnegie Mellon University transcript will include information on such courses as follows: Carnegie Mellon courses and courses taken through the university's cross-registration program will have grades recorded on the transcript and be factored into the QPA. All other courses will be recorded on this transcript indicating where the course was taken, but without grade. Such courses will not be taken into account for academic actions, honors or QPA calculations. (Note: suspended students may take courses elsewhere; however, they may receive transfer credit only if their college's and department's policies allow this.)

Courses must be approved by the Director for transfer credit.

### *Statute of Limitations*

As outlined in the Master's Students Statute of Limitations, <http://www.cmu.edu/policies/documents/MastersStudentStatuteLimitations.html>, students who have matriculated at Carnegie Mellon beginning Fall 2012 will complete all requirements for the master's degree within a maximum of seven years from original matriculation as a master's student, or less. Once this time-to-degree limit has lapsed, the person may resume work towards a master's degree only if newly admitted to a currently offered master's degree program under criteria determined by that program.

Under extraordinary circumstances, such as leave of absence, military or public service, family or parental leave, or temporary disability, a school or college may, upon the relevant department's recommendation and with the written approval of the dean (or designate), defer the lapse for a period commensurate with the duration of that interruption. Students who are pursuing a master's degree as part-time students for all semesters of their program, as approved by their program, may also appeal to their program or department for extension of the time to degree limit.

## **Purchasing and Reimbursement Protocols and Policies**

### *Purchasing Procedure*

All purchases of goods, services, and equipment using University funds, including restricted accounts and research grants and contracts, must receive prior approval from the Executive Director or the Program Director. Lauren Hardwig will handle most purchases.

If you use your own cash, check or credit card to make a purchase over \$20, it may not be possible to reimburse you for the expenditure. Since the University is a tax-exempt institution, under no circumstances will sales tax be reimbursed with the one exception being on travel expenses. All purchases must have prior approval of the Executive Director or the Program Director.

Itemized receipts and packing slips for all purchases are to be promptly given to Lauren Hardwig for reconciliation and purchase documentation. Credit Card receipts will not be accepted.

Office supplies are available for purchase at the University Store and are not provided by the department.

## Graduate Student Reimbursement Policy

### *Capstone Expenses*

Legitimate business expenses can be reimbursed by the department. Lauren Hardwig will help you claim reimbursement provided you have the following:

- Itemized receipt indicating item purchased and proof of payment
- Business purpose for purchasing item
- Account to be charged for reimbursement
- Approval by the Executive Director or the Program Director and subsequent signature for reimbursement
- Signed expense report

Please consult with the Executive Director or the Program Director prior to incurring the expense for additional instruction.

### *Travel Expenses*

Pre-approved legitimate travel expenses can be reimbursed by the department. Lauren Hardwig will help you claim reimbursement once you provide the following:

- All receipts must be itemized and specify the items purchased. Credit card slips are not acceptable receipts.
- Hotel receipts must show a zero balance with proof of payment and your name
- Students may only reserve lodging through AirBnB with prior approval from the Program Director.
- Receipts for meals must be collected, you cannot claim per diem meals.
- Personal car mileage is calculated at the current IRS rate per mile; mileage covers gas, but not tolls.
- Business purpose for travel
- Account to be charged for reimbursement
- Approval (by faculty member) and subsequent signature for reimbursement
- Signed travel expense report

### *Conditions:*

All receipts must have proof of purchase indicated. For business expenses, tax will not be reimbursed under any circumstance, except for non-travel business meals. To avoid paying tax, see if a staff member can purchase the item for you with a University-provided Tartan Credit Card.

Tax will be reimbursed for expenses incurred due to normal business related travel (hotel, airfare, meals), but NOT for miscellaneous expenses such as the purchase of a replacement mouse for a department laptop, poster board for a presentation, etc., purchased while traveling or preparing for travel. These items should have been purchased through a department approved buyer thus not incurring tax expense.

## Absences

The HCII views attendance as an individual student responsibility. Students are expected to attend classes, task and team meetings, presentations, seminars, and so forth. For meetings where the student's absence could hinder the performance of the group, such as task meetings, team meetings and group presentations, it is the student's responsibility to provide satisfactory evidence to the METALS Director METALS to substantiate the reason for the absence. Among the reasons absences are considered excused by the program are the following:

- Death or major illness in a student's immediate family. Immediate family refers to: mother, father, sister, brother, grandparents, spouse, or child. If unclear, check with your program director in advance of your absence.
- Illness of a dependent family member.
- Illness that is too severe or contagious for the student to attend (to be determined by Health Center or off-campus physician).

## Leaves of Absence

Students who wish to leave their program temporarily (outside of industrial research internships) may request a leave of absence by submitting a request to their program director. If granted, leaves are initially extended for a period of no more than one year. However, an extension of up to one additional year may be granted under exceptional circumstances. When an extension is granted, the conditions for return must be negotiated with the advisor and approved by the program director prior to returning to the program. Further extensions of leave will not be granted. Students should be in good standing in order to be granted a leave of absence.

Students on leave of absence must contact their program coordinator two months prior to the end of the leave to indicate their plans. While a leave can in principle start at any time, university regulations allow students to return only at the beginning of a semester (usually late August or January).

## Maternity Accommodation Protocol

[http://www.cmu.edu/student-affairs/theword/acad\\_standards/creative/studentmaternityprotocol.html](http://www.cmu.edu/student-affairs/theword/acad_standards/creative/studentmaternityprotocol.html)

Students whose anticipated delivery date is during the course of the semester may consider taking time away from their coursework and/or research responsibilities. All female students who give birth to a child while engaged in coursework or research are eligible to take either a short-term absence or formal leave of absence. Students in course work should consider either working with their course instructor to receive incomplete grades, or elect to drop to part-time status or to take a semester leave of absence. Students engaged in research must work with their faculty to develop plans for the research for the time they are away.

Students are encouraged to consult with relevant university faculty and staff as soon as possible as they begin making plans regarding time away. Students must contact the Office of the Dean of Student Affairs to register for Maternity Accommodations. Students will complete an information form and meet with a member of the Dean's Office staff to determine resources and procedures appropriate for the individual student. Planning for the student's discussion with her



academic contact(s) (advisor, associate dean, etc.) will be reviewed during this meeting.

### **Intellectual Property Disputes**

Disputes concerning rights to intellectual property must be resolved according to the procedures set forth in the University's Intellectual Property Policy, available at:

<http://www.cmu.edu/policies/documents/IntellProp.html>.

### **Research Misconduct**

Carnegie Mellon University is responsible for the integrity of research conducted at the University. As a community of scholars, in which truth and integrity are fundamental, the University has established procedures for the investigation of allegations of misconduct of research with due care to protect the rights of those accused, those making the allegations, and the University.

The procedures for handling allegations of research misconduct are set forth in the Policy for Handling Alleged Misconduct in Research at Carnegie Mellon University, available at

<http://www.cmu.edu/policies/documents/ResrchMisc.html>.

For graduate students found responsible for research misconduct, the President of the University may impose specific sanctions up to and including expulsion. The imposition of sanctions is subject to the procedures for approval and/or appeal prescribed for community standards violations, available at

[http://www.studentaffairs.cmu.edu/theword/comm\\_standards/standards.html](http://www.studentaffairs.cmu.edu/theword/comm_standards/standards.html)

### **University Policies & Expectations**

It is the responsibility of each member of the Carnegie Mellon community to be familiar with university policies and guidelines. In addition to this departmental graduate student handbook, the following resources are available to assist you in understanding community expectations:

- The Word/Student Handbook: [www.cmu.edu/student-affairs/theword//index.html](http://www.cmu.edu/student-affairs/theword//index.html)
- Academic Integrity Website: [www.cmu.edu/academic-integrity](http://www.cmu.edu/academic-integrity)
- University Policies Website: [www.cmu.edu/policies/](http://www.cmu.edu/policies/)
- Graduate Education Website: <http://www.cmu.edu/graduate/policies/index.html>

Please see Appendix A for additional information about The Word and University resources.

### ***The Carnegie Mellon Code***

Students at Carnegie Mellon, because they are members of an academic community dedicated to the achievement of excellence, are expected to meet the highest standards of personal, ethical and moral conduct possible.

These standards require personal integrity, a commitment to honesty without compromise, as well as truth without equivocation and a willingness to place the good of the community above

the good of the self. Obligations once undertaken must be met, commitments kept.

As members of the Carnegie Mellon community, individuals are expected to uphold the standards of the community in addition to holding others accountable for said standards. It is rare that the life of a student in an academic community can be so private that it will not affect the community as a whole or that the above standards do not apply.

The discovery, advancement and communication of knowledge are not possible without a commitment to these standards. Creativity cannot exist without acknowledgment of the creativity of others. New knowledge cannot be developed without credit for prior knowledge. Without the ability to trust that these principles will be observed, an academic community cannot exist.

The commitment of its faculty, staff and students to these standards contributes to the high respect in which the Carnegie Mellon degree is held. Students must not destroy that respect by their failure to meet these standards. Students who cannot meet them should voluntarily withdraw from the university.

The Carnegie Mellon Code can also be found on-line at:  
<http://www.cmu.edu/student-affairs/theword/code.html>.

### *Reasonable Person Principle*

We believe that quality does not come from rules and structure, but from high standards and a vigorous and exciting environment. Consequently the department has a bare minimum of rules and requirements. Instead, as in other parts of the Institute and School, we rely on the reasonable person principle. This principle says in essence that we should all operate under the assumption that we are reasonable and intelligent adults in a cooperative community, and that we will operate in all situations as a reasonable person would. Everyone is expected to know that the lack of a specific rule is not a license to game the system, subvert its intent, or do something outside what any reasonable person would see as right. When something is not clear, ask first!

### *Community Standards, Policies & Procedures*

Carnegie Mellon is a community of diverse members committed to maintaining an environment that encourages personal and intellectual growth that promote our traditions of innovation, leadership, responsibility to society, learning, dedication, commitment to quality and commitment to each other. We are a community with high standards and high expectations for those who choose to become members, including established community standards intended to foster behavior that is consistent with a civil and educational setting.

It is the responsibility of each community member to become familiar with the standards and expectations of the Carnegie Mellon community. In general, each member should:

- Respect the rights of others
- Respect the property of individuals, groups and Carnegie Mellon

- Know, understand and abide by all Carnegie Mellon community standards, policies and regulations, as well as all local, state and federal laws.
- Engage in behavior that does not interfere with individual, group or Carnegie Mellon regular activities and/or operation
- Ensure that guests behave in a manner consistent with and in accordance with the expectations of our community. At the core, the standards, policies and regulations of the Carnegie Mellon community are designed with one or more of the following four purposes: to promote and protect the rights of members of, or visitors to, the community; to promote and protect the health and safety of members of, or visitors to, the community; to promote and protect the academic integrity of the community; and to promote the respect of and protect the property of the community members and University.

### ***Community Standards Violations***

As members of the University community, Carnegie Mellon students are expected to respect the rights of all students, faculty and staff and adhere to the policies outlined in the Student Handbook contained in The Word, available at <http://www.studentaffairs.cmu.edu/theword/> and any applicable college, department or graduate program handbooks. If a student has observed a violation of university policy or law, or feels harmed by another student's misconduct (e.g. affecting his/her welfare, property, safety or security) he/she should file a report with the Dean of Student Affairs, the Student Life Office, and/or University Police as appropriate.

The procedures for adjudicating community standards violations and for appealing the results are available at [http://www.studentaffairs.cmu.edu/theword/comm\\_standards/standards.html](http://www.studentaffairs.cmu.edu/theword/comm_standards/standards.html).

### ***University Policy Links***

#### **Student Policy Links:**

<http://www.cmu.edu/policies/StudentPolicy.html>

#### **Policy on Equal Employment Opportunities/Affirmative Action**

<http://www.cmu.edu/policies/documents/EEOAA.html>

#### **Alcohol & Drugs**

<http://www.cmu.edu/policies/documents/DrugAlcohol.html>

#### **Grading Policies**

<http://www.cmu.edu/policies/documents/Grades.html>

#### **Privacy Rights of Students**

<http://www.cmu.edu/policies/documents/StPrivacy.html>

#### **Copyright Policy**

<http://www.cmu.edu/policies/documents/Copyright.html>

## Student Health Insurance Policy

<http://www.cmu.edu/health-services/student-insurance/>

### *Disciplinary Action for Cheating or Plagiarism*

While there is a university-wide disciplinary committee which handles serious disciplinary matters referred to it, the responsibility for establishing disciplinary guidelines rests with each department. It is felt that the following set of rules can be uniformly and fairly applied in the Human-Computer Interaction Institute.

First, cheating in any form is not permitted as an ethical or professional behavior and will not be tolerated. Cheating includes, but is not necessarily limited to:

- The use of unauthorized materials including computer programs in preparation of an assignment or during an examination.
- The submission or use of falsified data.
- The submission of work that is not the student's own.
- Plagiarism- use or close imitation of the language and thoughts of another author and the representation of them as one's own original work. (See below)
- The use of an alternate/stand-in/proxy during an examination.
- Supplying unauthorized data to another student for the preparation of an assignment or during an examination.
- Collaboration in the preparation of an assignment, unless specifically required or allowed by the instructor, will usually be viewed as cheating. Each student, therefore, is responsible for understanding the policies of the instructor offering any course as they refer to the amount of help and collaboration permitted in preparation of assignments.

Should any student be found guilty of cheating on a quiz, exam, homework or project, at minimum a zero grade will be recorded and then averaged in with the other grades (should there be any) for the term. Depending on the circumstances, and at the discretion of the instructor and the Department Head, the student may be failed in the course and may be expelled from the University. In any case, the University will be notified of any case of cheating or plagiarism. A repeated occurrence of cheating will be treated as an automatic failure (R grade) and expulsion from the University.

A subtler form of cheating arises in the form of plagiarism, which is defined as "passing off as one's own the ideas or works of another." Making use of reference material and failing to note (either at all or properly) the original source constitutes plagiarism. When two or more people work together on an individual project and each then turns in his/her individual report as though no collaboration was involved, this also is plagiarism. Simply rewriting another's words or thoughts, or rearranging another's materials, is in every sense plagiarism - unless the student

properly and completely references such material, each and every time it is used and to the full extent of usage.

Should a case of plagiarism arise, the initial responsibility for judging the seriousness of the offense will rest with the instructor. If the instructor feels that the student was simply sloppy in referencing the material used and plagiarized, a judgment of sloppy professionalism rather than cheating will be made. The grade for the paper, project or thesis will be lowered by at least one grade point. On the other hand, if the instructor feels that the student plagiarized flagrantly, and intentionally meant to mislead the instructor into thinking that the work was the student's own original work, the grade for the report, project or thesis will be recorded as zero.

It should be emphasized that any group collaboration that involves individual take home projects, papers or theses should be carried out only with considerable discretion. That is, students are encouraged to discuss and collaborate among themselves on the various principles which are explicated in class or covered in the reading material, etc.; but any group discussion or collaboration which involves any specifics of take-home projects, papers or theses should be avoided - unless the ideas or efforts of others are properly noted. Put differently, when individual work and thinking is called for, group thinking and/or work is entirely inappropriate and is a form of plagiarism.

In any case of cheating or plagiarism, the student may request a review of the instructor's decision by the department head, who will then make the final decision for the department. The student, of course, can appeal any faculty decision to the University Committee on Discipline. In a case of flagrant cheating by a graduate student on a thesis, the matter will be forwarded to the Disciplinary Committee for stronger action.

Please review the entire policy at: <http://cmu.edu/policies/documents/Cheating.html>

### ***Discriminatory Harassment***

Carnegie Mellon is firmly committed to intellectual honesty, freedom of inquiry and expression and respect for the dignity of each individual. Acts of discriminatory harassment or intimidation will not be tolerated, whether based on race, ancestry, color, national origin, gender, disability, religion, creed, belief, age, veteran status or sexual orientation.

Graduate Students with concerns or grievances related to discriminatory harassment or intimidation by another student should contact the Dean of Student Affairs for resolution. Acts of harassment or intimidation by a student may be referred the University Committee on Discipline.

Graduate Students with concerns or grievances related to alleged discriminatory harassment or intimidation by a faculty or staff member should contact the University Ombudsman and Assistant Vice President for Diversity and Equal Opportunity Services (412) 268-1018. In cases of discriminatory harassment where the alleged actor is a faculty or staff member, the process will follow (as closely as appropriate under the circumstances of the case) the process outlined for resolution of claims of sexual harassment.

### *Sexual Harassment*

Graduate student grievances or concerns relating to sexual harassment will be handled according to the University's Policy Against Sexual Harassment. Any member of the university community, whether faculty member, student, or staff member, who believes she or he has been subjected to sexual harassment or knows of the occurrence of probable sexual harassment is strongly urged to immediately contact one of the sexual harassment advisors or policy coordinators directly, Office of Title IX Initiatives, <http://www.cmu.edu/title-ix/>, (412-268-7125), or with the help of the sexual harassment hotline (412-268-7445).

For further information about the processes contemplated by the University's Policy Against Sexual Harassment, see, Policy Against Sexual Harassment <http://www.cmu.edu/policies/documents/SexHarass.html> and Sexual Harassment Advisors <http://www.cmu.edu/policies/documents/HarassSupplement.html>.

### *Cultural Awareness and Respect*

The HCII is an extremely diverse department. This year you will join students from different countries and cultures all around the world with whom you will work and live as a community. Working with colleagues from different backgrounds than your own is an invaluable learning experience, and an integral part of education. We expect that students from different cultures will have different attitudes, including attitudes toward gender, race, age, religion, sexual orientation, and disability, and encountering and discussing these differences may form the subject of some of your most valuable learning moments. And yet, regardless of your attitudes or those of your peers, respect must govern every one of your actions. That is, we expect that students and faculty, regardless of background, age or rank, will deal with each other respectfully, without insult or antagonism. Because of the importance of respect in the intensely collaborative environment of the HCII, violations will be dealt with severely. Repeated infractions may result in a student's termination from his/her program, in which case no tuition refund will be available.

### **Financial Support:**

#### Financial Aid Information

#### Emergency Loans

Graduate students who find themselves in need of immediate funds for emergency situations should contact the Office of the Dean of Student Affairs (see Appendix A), [www.cmu.edu/student-affairs/index.html](http://www.cmu.edu/student-affairs/index.html), to inquire about an Emergency Student Loan.

The Office of the Dean of Student Affairs (Warner Hall, 3rd floor, x8-2075) offers short-term emergency loans for supplies, medication, food or other unexpected circumstances. The loans are interest-free and for short periods of time (not longer than a month).

Graduate students should consult the graduate student financial aid information found on The HUB website: <http://www.cmu.edu/finaid/graduate/index.html>. Students will find the Graduate Financial Aid Guide, information about funding options and how to apply for financial aid and other helpful links.

## Taxes

The deadline for local, state, and federal taxes is April 15. You can obtain tax forms in the mail, at the post office, or at the Carnegie Library. Questions about your tax status should be addressed to the IRSTeleTax at 412-261-1040, or the Pennsylvania Department of Revenue at 412-565-7540. Although subject to federal taxes, student stipends are generally not assessed local or state taxes.

## New Policies

When policies are changed it is because the department believes the new rules offer an improvement; any such changes will be discussed at a meeting with the graduate students. However, students currently enrolled whose degree program is affected by a change in policy may choose to be governed by the older policy that was in place at the time of their matriculation. In case degree requirements are changed and certain courses are no longer offered, the department will try to find some compromise that allows those students to satisfy the original requirements.

## Additional Policies/Protocols

### Assistance for Individuals with Disabilities

The Office of Disability Resources at Carnegie Mellon University has a continued mission to provide physical and programmatic campus access to all events and information within the Carnegie Mellon community. We work to ensure that qualified individuals receive reasonable accommodations as guaranteed by the Americans with Disabilities Act (ADA) and Sections 503 and 504 of the Rehabilitation Act of 1973. Students who would like to receive accommodations must submit a [Voluntary Disclosure of Disability Form](#) to [access@andrew.cmu.edu](mailto:access@andrew.cmu.edu) to begin the interactive accommodation process.

For more information please see <http://www.cmu.edu/hr/eos/disability/index.html>. Students with disabilities are encouraged to self-identify with Equal Opportunity Services by contacting Larry Powell, 412-268-2013, [lpowell@andrew.cmu.edu](mailto:lpowell@andrew.cmu.edu) to access the services available at the university and initiate a request for accommodations.

### Summary of Graduate Student Appeal and Grievance Procedures

<http://www.cmu.edu/graduate/policies/Summary%20of%20Graduate%20Student%20Appeal%20and%20Grievance%20Procedures.html>.

Graduate students will find the Summary of Graduate Student Appeal and Grievance Procedures on the Graduate Education Resource webpage. This document summarizes processes available to graduate students who seek review of academic and non-academic issues. Generally, graduate students are expected to seek informal resolution of all concerns within the applicable department, unit or program before invoking formal processes. When an informal resolution cannot be reached, however, a graduate student who seeks further review of the matter is to follow the formal procedures outlined here. These appeal and grievance procedures shall apply to students in all graduate programs of the University. Students should refer to the department specific information in this handbook for department and college information about the administration and academic policies of the program. Additionally, students may confer with the graduate student ombudsman, Suzie Laurich-McIntyre, [slaurichmcintyre@cmu.edu](mailto:slaurichmcintyre@cmu.edu), on issues of process or other concerns as they navigate conflicts



## Appendix A - Elective Course Descriptions

Descriptions of the elective courses. For the most up to date elective descriptions please refer to: <https://enr-apps.as.cmu.edu/open/SOC/SOCServlet>.

### *Technology*

#### **Personalized Online Learning (05-832)**

This course is offered as a 9-credit version and a 12-credit version. The 9-credit version of the course does not involve programming; the 12-credit version involves rule-based programming, as detailed below.

This course addresses the use of cognitive psychology and cognitive task analysis to create computer-based *intelligent tutoring systems*. Students will learn data-driven and theoretical methods for creating cognitive models of human problem solving. Such models have been used to create educational software that has been demonstrated to dramatically enhance student learning in domains like mathematics and computer programming. This type of software, which originated at CMU and is now widely used in US high schools and middle schools, is probably *the* premier application of cognitive science in education.

In addition to discussion and readings on methods and models of problem solving, learning, and tutor design, the course will have a substantial “learning by doing” component. Students will be analyzing data, designing cognitive models and interfaces, and implementing an intelligent tutoring system. Students will use CTAT (the Cognitive Tutor Authoring Tools, see <http://ctat.pact.cs.cmu.edu>) to construct tutors. Tutors built with CTAT for middle-school mathematics can be found on the Mathtutor web site (<https://mathtutor.web.cmu.edu/>).

The hands-on portion of the course differs between the 9-credit version or the 12-credit version. *In the 9-credit version of the course*, students will use the CTAT tools for non-programmers to create tutors. In this version of the course, no programming is required and no programming background is needed. *In the 12-credit version of the course*, students will learn to create rule-based cognitive models for more sophisticated tutors, a form of Artificial Intelligence programming. They will learn to program such models in the Jess production rule language, which is integrated in CTAT.

The course targets students in Human-Computer Interaction, Psychology, Computer Science, Design, or related fields, who are interested in educational applications. Students should either have programming skills, or experience in the cognitive psychology of human problem solving, or experience with instructional design.

#### **Design of Educational Games (05-818) Ogan**

The potential of digital games to improve education is enormous. However, it is a significant challenge to create a game that is both fun and educational.

In this new course students will learn to meet this challenge. The course will involve a significant hands-on portion in which students create multiple educational games. Students may create digital or non-



digital games – the design process is largely the same. They will also read about game design, instructional design, learning and transfer, and the educational effectiveness of digital games.

The co-instructors will be Vincent Alevan of the Human-Computer Interaction Institute and Eben Myers of the Entertainment Technology Center and Etcetera Edutainment. The intended audience comprises graduate students in HCI, CS, ETC, Design, and students interested in education or psychology research. Prerequisite: one course in HCI, game design, or cog/ed psych.

### **Computer Supported Collaborative Learning (05-899) Rose**

The field of Computer Supported Collaborative Learning has as one of its foundational goals to work towards understanding the pedagogical and technological features that make on-line education in general, and collaborative learning in particular, effective. If we can understand the causal connections between interaction and learning, then we can wield technology in ways that achieve maximal cognitive and social benefits for on-line learners. The purpose of this class is to expose students to the foundational theoretical and methodological issues underlying previous work in collaborative learning, to introduce students to the wide range of current approaches to collaborative learning support that exist within the field of Computer Supported Collaborative Learning, and to offer students a vision of where the field is going through review of recent articles as well as hands on experience with new technologies. The course is structured primarily around group discussions of weekly reading assignments as well as a major term project in which students will work in small groups to design and prototype a form of adaptive collaborative learning support.

### **Applied Machine Learning (05-834) Rose**

Machine Learning is concerned with computer programs that enable the behavior of a computer to be learned from examples or experience rather than dictated through rules written by hand. It has practical value in many application areas of computer science such as on-line communities and digital libraries. This class is meant to teach the practical side of machine learning for applications, such as mining newsgroup data or building adaptive user interfaces. The emphasis will be on learning the process of applying machine learning effectively to a variety of problems rather than emphasizing an understanding of the theory behind what makes machine learning work. This course does not assume any prior exposure to machine learning theory or practice. In the first 2/3 of the course, we will cover a wide range of learning algorithms that can be applied to a variety of problems. In particular, we will cover topics such as decision trees, rule based classification, support vector machines, Bayesian networks, and clustering. In the final third of the class, we will go into more depth on one application area, namely the application of machine learning to problems involving text processing, such as information retrieval or text categorization.

### **Machine Learning (10-701) Singh**

It is hard to imagine anything more fascinating than automated systems that improve their performance through experience. Examples range from robots learning to better navigate based on experience gained by roaming their environments, medical decision aids that learn to predict which therapies work best for which diseases based on historical health records, and speech recognition systems that learn to better understand your speech based on experience listening to you. Machine learning is concerned with the study and development of techniques that can automatically learn from data. This course is designed to give a graduate-level student a thorough grounding in the methodologies, technologies, mathematics and algorithms currently needed by people who do research in machine learning, and related disciplines and applications.

### **Computational Models of Discourse Analysis (11-719) Rose**

Discourse analysis is the area of linguistics that focuses on the structure of language above the clause level. It is interesting both in the complexity of structures that operate at that level and in the insights it offers about how personality, relationships, and community identification are revealed through patterns of language use. A resurgence of interest in topics related to modeling language at the discourse level is in evidence at recent language technologies conferences. This course is designed to help students get up to speed with foundational linguistic work in the area of discourse analysis, and to use these concepts to challenge the state-of-the-art in language technologies for problems that have a strong connection with those concepts, such as dialogue act tagging, sentiment analysis, and bias detection. This is meant to be a hands on and intensely interactive course with a heavy programming component. The course is structured around 3 week units, all but the first of which have a substantial programming assignment structured as a competition (although grades will not be assigned based on ranking within the competition, rather grades will be assigned based on demonstrated comprehension of course materials and methodology).

### **Software Engineering for Information Systems (11-791)**

11-791 is a one-semester, 12-unit course which covers the fundamental principles of software engineering for information technology. The focus includes both project management (estimation, planning, tracking, risk) and software methodology (analysis, design, implementation, testing). A basic understanding of programming is required. During the second half of the course, students will exercise the principles they have learned by analyzing, designing, and planning a specific software project.

### **The Data Pipeline: Collecting and Using Data for Interactive Systems (05-839) Mankoff**

The increasing availability of data has created a sea change in the way we build interactive systems. It is possible to easily access information about a person's activities, online and offline, about the state of the world around them, and about the activities of other people connected to them either directly or through their use of shared resources. This information can help to contextualize interaction, support inference, provide recommendations, or be directly investigated by the user themselves. The goal of this course is to provide you with the tools to build data-driven interactive systems and explore the new opportunities enabled by this data through a combination of guest lectures, discussion of current literature, and practical skills development. Over the course of the semester, you will learn about the entire data pipeline from sensing to cleaning data to different forms of analysis and computation.

### **Mobile Service Innovation (05-899 B)**

Attention entrepreneurs, designers, and engineers! This course teaches you to invent mobile information services. You will learn about value-creation in the service sector and a human-centered design process including improv brainstorming, story-boarding, interviewing, video sketches, and selling. Students work in small, interdisciplinary teams to discover unmet needs of users. They create multiple concepts of a mobile service and assess their technical feasibility, financial viability, and desirability. Then they choose a single service idea and produce a plan with a business model and a video sketch suitable for posting on a crowd funding site. Grades will be determined primarily by the quality of the team's products.

### **Role of Technology in Learning in the 21st Century (05-838)**

Computing is increasingly harnessed to address pressing educational challenges of the 21st century: under-performing inner-city schools, integrating immigrants into the school system, irregular school attendance in rural developing regions, and women empowerment in the developing world. This course is open to all undergrads and grad students, with technical or non-technical backgrounds. We will cover

theory and practical applications of the Learning Sciences, Educational Technology and Human-Computer Interaction, framed around authentic problems such as the above. Students will apply concepts from the course to examine existing solutions such as Sesame Street's The Electric Company, Leapfrog's literacy gadgets and the \$100 laptop. Students will work in teams on semester-length design projects to tackle educational problems of their choice, on platforms such as cellphones, interactive videos or gaming (Nintendo's Wii/DS/\$10 TV-Computer). Confirmed guest speakers include the World Bank's Education Sector and Microsoft's Global Learning Group.

### **Gadgets, Sensors and Activity Recognition in HCI (05-833)**

This course will cover new techniques and technologies for creating high quality user interfaces. It will consider current work in this area, emphasizing readings from the research literature as well as practical projects involving the implementation of new concepts in user interface software or other technology. Typical topics to be covered might include: advanced interaction techniques, ubiquitous computing, tangible interfaces, mobile and wearable computing, web-based interaction, information visualization, virtual and augmented reality, new input devices, audio, speech, and other new interaction modalities. Specific topics for each year will be chosen from the current research literature.

### *Learning Sciences Theory & Instructional Design*

#### **Learning and Motivation (05-899) Aleven**

Motivation plays, presumably, a large role in academic learning. Researchers have put forward a number of theoretical frameworks to explain how affect and motivation influence students' learning, and conversely, how students' learning outcomes influence the motivation with which they approach subsequent learning tasks.

This seminar-style course examines key affective and motivational variables and the major theoretical frameworks that relate them to learning. We will review how much of the variance in students' learning outcomes may be explained by motivational and affective variables. We will also explore how much is known about how a tutor, teacher, student, or learning environment can influence students' affect and motivation and thereby enhance the robustness of student learning. We will focus on technology-enhanced learning environments, but other types of learning environments will be examined as well. We will examine the literature on learning environments explicitly designed to improve motivation and affect, including intelligent tutoring systems (e.g., "enriched" with affective learning companions) and educational games.

The course will involve extensive reading. As textbook we will use "Motivation in Education: Theory, Research, and Applications" (3rd Edition) by Dale H. Schunk, Paul R. Pintrich, and Judith Meece. In addition, students will read original research papers. Students will present papers to the class and complete a term project.

The seminar is meant for graduate students and upper-level undergraduates in human-computer interaction, psychology, design, and related fields. Prerequisites: a course in research methods, cognitive or educational psychology, or technology-enhanced learning, or permission from the instructor.

#### **Cognitive Development (85-723)**

The general goals of this course are that students become familiar with the basic phenomena and the leading theories of cognitive development, and that they learn to critically evaluate research in the area. Piagetian and information processing approaches will be discussed and contrasted. The focus will be upon the development of children's information processing capacity and the effect that differences in capacities have upon the child's ability to interact with the environment in problem solving and learning situations.

### **Human Expertise (85-792) Lovett**

The process of becoming an expert involves many changes, some quantitative and some qualitative. This course will provide an up-to-date account of the theory and data concerning the development of expertise. Questions addressed include the following. What does it take to become an expert? Are experts born or made? Is the process of acquiring expertise common across different domains from music to sports to science? Research studied in the course will employ a variety of methodologies, from case studies to protocol analysis to computational modeling.

### **Applications of Cognitive Science (85-795, 05-795) Klatzky**

The famous psychologist George Miller once said that Psychology should "give itself away." The goal of this course is to look at cases where we have done so -- or at least tried. The course focuses on applications that are sufficiently advanced as to have made an impact outside of the research field per se. That impact can take the form of a product, a change in practice, or a legal statute. The application should have a theoretical base, as contrasted, say, with pure measurement research as in ergonomics. Examples of applications are virtual reality (in vision, hearing, and touch), cognitive tutors based on models of cognitive processing, phonologically based reading programs, latent semantic analysis applications to writing assessment, and measures of consumers' implicit attitudes. The course will use a case-study approach that considers a set of applications in detail, while building a general understanding of what it means to move research into the applied setting. The questions to be considered include: What makes a body of theoretically based research applicable? What is the pathway from laboratory to practice? What are the barriers - economic, legal, entrenched belief or practice? The format will emphasize analysis and discussion by students.

### **Scientific Research in Education (85-736) Klahr**

Most of what we know about thinking, learning, memory, concept formation, problem solving, and so on, comes from laboratory experiments by researchers in cognitive psychology, cognitive science, and cognitive development. But how can this knowledge be used to improve teaching and learning in real classrooms? That is the question that we will explore in this advanced undergraduate and graduate seminar. We will read and critically review papers dealing with the creation, implementation, and evaluation of new approaches to instruction. We will examine a variety of such interventions, ranging from specific topics to entire curricula. This topic is especially timely, because of the highly influential (and controversial) "No Child Left Behind Act" (NCLB), passed in 2002. Perhaps the most widely-known consequence of the law is its emphasis on testing and assessment, which has wide-spread implications for the way that American children will be taught and tested and the way that schools will be evaluated and rewarded. Equally important, but perhaps less widely-known outside academic circles, is NCLB's repeated emphasis on scientifically based education research. This new pressure for evidence-based policy and practice in education has brought a sense of urgency to understanding the ways in which the basic tenets of science can be applied to educational research. This seminar will address the fundamental question: *What does it mean to do scientific research in education?* by reviewing some of the recent educationally-relevant research on how students learn, primarily, but not exclusively, in the areas of math and science.

## *Methods & Design*

### **Game Design Studio (05-899) Hammer**

This course is a project-based course that covers the fundamentals of game design, including games as formal systems, important game genres, player psychology, player experience, the game design process, and the role of games in culture. The course emphasizes the development of craft, iterative design, and rigorous innovation. Students should expect to play a wide variety of games, observe players carefully, participate in hands-on exercises, and produce multiple game prototypes over the course of the semester. No programming experience or game expertise required. Bring your work ethic and your sense of fun!

### **Human Factors (05-813)**

This course uses theory and research from human factors, cognitive science, and social science to understand and design the interactions of humans with the built world, tools, and technology. The course emphasizes current work in applied domains such as automotive design, house construction, medical human factors, and design of information devices. The course also will emphasize not only individual human factors (e.g., visual response, anthropometry) but also the organizational arrangements that can amplify or correct human factors problems. Through reading, discussion, and projects, you will learn about human perceptual, cognitive, and physical processes that affect how people interact with, and use, technology and tools. You will learn why we have so many automobile accidents, voting irregularities, and injuries from prescription medication. You will learn some tried and true solutions for human factors problems, and some of the many problems in human factors that remain. You will also have gained experience in research in this field.

### **Stats: Experimental Design for Behavioral and Social Sciences (36-749)**

Statistical aspects of the design and analysis of planned experiments are studied in this course. A clear statement of the experimental factors will be emphasized. The design aspect will concentrate on choice of models, sample size and order of experimentation. The analysis phase will cover data collection and computation, especially analysis of variance, and will stress the interpretation of results. In addition to weekly lecture, students will attend a computer lab once a week. Prerequisite: 36-202, 36-220, or 36-247.

### **Research Methods for the Learning Sciences (85-748)**

The goals of this course are to learn data collection, design, and analysis methodologies that are particularly useful for scientific research in education. The course will be organized in modules addressing particular topics including overview of methods, cognitive task analysis, qualitative methods, protocol and discourse analysis, and data mining and log analysis. A key goal is to help students think about and learn how to apply these methods to their own research programs. To enroll you must have taken 85-738, "Educational Goals, Instruction, and Assessment" or get the permission of the instructor.

### **Design of Educational Games (05-818)**

The potential of digital games to improve education is enormous. However, it is a significant challenge to create a game that is both fun and educational. In this course, students will learn to meet this challenge by combining processes and principles from game design and instructional design. Students will also learn to evaluate their games for fun, learning, and the integration of the two. They will be guided by the EDGE framework for the analysis and design educational games. The course will involve a

significant hands-on portion, in which students learn a design process to create educational games — digital or non-digital. They will also read about existing educational games and discuss game design, instructional design, learning and transfer, and the educational effectiveness of digital games. They will analyze an educational game and present their analysis to the class.

The intended audience includes graduate and advanced undergraduate students in HCII, CS, ETC, Design, and students interested in education or psychology research.

To be eligible to enroll, students must have successfully completed one course in human-computer interaction, game design, computer science, or cognitive/educational psychology, or they must have instructor permission.

During most weeks, we will have a lecture and a course meeting devoted to student game presentations, discussion of homework assignments, and hands-on work. The lecture meetings will be devoted to discussions focused on the course readings. The hands-on part will be opportunities for students to work on assignments and projects, and to discuss progress and open issues with the course instructors.

### **Adaptive Service Design (05-897)**

Today's laws mandate reasonable attempts to meet accessibility, and today's designers help to enable or disable access. This mini will cover key concepts in computer accessibility, focusing particularly on the web.

- How people with disabilities view computers
- Design guidelines for accessibility
- Specific strategies for making your website accessible
- Analytics for web accessibility

### **Social Perspectives in HCI (05772)**

One of a series of four, seminar style mini-courses, to expose our PhD students to the breadth of classic and cutting edge research in four distinct traditions in HCII—computer science, cognitive science, social science, and design. Although no project is required for this course, there will be significant reading and writing. The four courses are:

- 05-772 Social Perspectives in HCI
- 05-773 Computer Science Perspectives in HCI
- 05-774 Cognitive Science Perspectives in HCI
- 05-775 Design Perspectives in HCI

### **Computer Science Perspectives in HCI (05773)**

One of a series of four, seminar style mini-courses, to expose researchers to the breadth of classic and cutting edge research in four distinct traditions in Human-Computer Interaction—computer science, cognitive science, social science, and design. Although no project is required for this course, there will be significant reading and writing. The four courses are:

- 05-772 Social Perspectives in HCI
- 05-773 Computer Science Perspectives in HCI
- 05-774 Cognitive Science Perspectives in HCI
- 05-775 Design Perspectives in HCI.

We will explore the innovations and challenges that have been tackled by the pioneers of our field over the past 60 years. The intersection of humans and computation has reflected dramatic changes in technology over time, from the vision of Vannevar Bush to the ability to predict human interruptibility with sensors.

The material in this class would be of value to anyone interested in classic and cutting edge work representing the history and future of computational innovation in the service of humans.

Each week, we will discuss one or two important areas. In the class itself, there will be reviews of readings, discussions and exercises in proposing new topics. You'll read six to eight articles to prepare for the class session. Papers will be selected either because they frame a sub area, are the first best paper in the area, represent different approaches to the a subarea and so on. While we cannot possibly cover every important paper that has been published in the last four decades, we will try to focus on pioneering work, and we will try to cover enough areas to give a sense of the breadth of HCI.

### **Research Methods in Human Centered Design (51-744)**

This course requires students to examine and apply several of the research methods currently employed by the design professions, including traditional, adapted, and innovative methods created by and for design. Students gain experience in method application through a parallel studio project phased through exploratory, generative, and evaluative research. Required of all first year Master of Design students, and linked to the Studio II project in Design 51-712. Others may be admitted by permission of the instructor, with preference given to those concurrently taking Design 51-712.

### ***General Electives***

**Any Additional Two Courses Above or Choose Two of (6 unit courses count as ½ course):**

#### **Computer Mediated Communication (05-817)**

This course examines fundamental aspects of interpersonal communication and considers how different types of computer-mediated communications (CMC) technologies affect communication processes. Among the topics we will consider are: conversational structure and CMC, tools to support nonverbal and paralinguistic aspects of communication such as gesture and eye gaze, and social and cultural dimensions of CMC. Students will be expected to post to weekly discussion lists, to write a paper on a specific aspect of CMC, and to present a talk on their final project to the class. The course should be appropriate for graduate students in all areas and for advanced undergraduates.

#### **Social Web (05-320)**

With the growth of online environments like MySpace, Second Life, World of Warcraft, Flickr, YouTube, Wikipedia, blogs, online support groups, and open source development communities, the web is no longer just about information. It is filled with social networks, multi-player games, and member-contributed content. This course, jointly taught by a computer scientist and a behavioral scientist, will examine how the social web operates, teach students how to build online communities, and help them understand the social impact of spending at least part of their lives online. We will examine what works and what fails to work in these online environments, and will use tools like Ruby on Rails and Drupal to build them. This class is open to advanced undergraduates and graduate students with either technical or non-technical backgrounds. Course work will include lectures and class discussion, homework, class presentations, and a group project

#### **Ubiquitous Computing (05-837)**

In this course, we will look at current research topics in ubiquitous computing by reading and discussing the recent literature drawn primarily from conferences such as Ubicomp, Pervasive, CHI, and UIST, as well as from magazines and journals such as IEEE Pervasive and Personal and Ubiquitous Computing. Students will be exposed to ubicomp applications, tools for building ubicomp systems, sensing systems, and issues with evaluating and using ubicomp systems. As this course is housed in the HCI Institute, there will be a particular emphasis on human-computer interaction issues. However, it will also cover topics in distributed systems, software engineering, and hardware design. There are no prerequisites for this class, and students from all backgrounds are invited to participate. Example topics to be covered include:

- Visions and challenges in ubiquitous computing
- The design and evaluation of different ubicomp applications, including
  - context-aware computing,
  - automated capture and access systems,
  - smart home, healthcare and assistive applications,
  - energy monitoring and sustainability,
  - mobile social network software
- Location and activity sensing
- Input and output techniques
- Programmable/autonomous physical environments
- Deploying and evaluating of ubicomp systems
- Privacy and social concerns

Finally, a research-oriented group project and an oral presentation are also required.

### **Inventing the Future of Services (11-794)**

*Inventing the Future of Services* is a course that focuses on the development of innovative thinking in a business environment. CMU graduates should not be waiting for their employers to tell them what to do – they should be driving radical innovation in their businesses. Drawing on my 17 years experience directing applied research at Accenture Technology Labs, I teach students systematic approaches to technology-driven business innovation in services industries.

The course will focus on the role of technology as a key driver of business change. The students will learn:

- How emerging technologies often dramatically alter the economics underlying many business processes
- How to evaluate the potential impact of various emerging technologies
- How to spot likely areas for business innovation
- How to create convincing visionary scenarios for new business processes; analyzing social, economic, environmental and other factors
- How to think creatively in a business context and how to present their ideas to future employers or sponsors

### **Analysis of Social Media (11-772)**

The most actively growing part of the web is "social media" (wikis, blogs, bboards, and collaboratively-developed community sites like Flickr and YouTube). This course will review selected papers from recent research literature that address the problem of analyzing and understanding social media. Topics to be covered include: -Text analysis techniques for sentiment analysis, analysis of figurative language,



authorship attribution, and inference of demographic information about authors (age or sex). - Community analysis techniques for detecting communities, predicting authority, assessing influence (in viral marketing), or detecting spam. -Visualization techniques for understanding the interactions within and between communities. -Learning techniques for modeling and predicting trends in social media, or predicting other properties of media (user-provided content tags.) Students should have a machine learning course (10-601 or similar) or consent of the instructor. Readings will be based on research papers. Grades will be based on class participation, paper presentations, and a project. More specifically, students will be expected to: -Prepare summaries of the papers discussed in class. Summaries will be posted on this wiki. -Present and summarize one or more "optional" papers from the syllabus (or some other mutually agreeable paper) to the class. -Do a course project in a group of 2-3 people. The end result of the project will be a written report, with format and length appropriate for a conference publication.

### **Evidence-Based Management (94-814)**

Contemporary managers are heavily swayed in their thinking and decisions by habit, fads, convention and unrealistic levels of confidence (March, 2010; Pfeffer & Sutton, 2006). Managers practicing EBMgt learn how to rethink their approaches to data and knowledge in order to make more effective decisions. EBMgt means making decisions based on best obtainable evidence, that is, scientific findings and unbiased organizational facts. These decisions rely on decision processes that reduce bias and judgment errors and give due consideration to ethical concerns. This mini course promotes your understanding and use of EBMgt principles. It also guides you in developing the skills and knowledge needed to identify, access, and use quality evidence from science and practice in making better decisions.

The instructor is committed to pursuing an evidence-based approach to the course itself. Scientific evidence strongly supports the effectiveness of active student participation in learning activities (Ambrose et al., 2010; Armstrong, 2010; Tough, 1971). Your success in this course will entail actively using evidence-based processes and practices.

Course topics:

- What It Means to be an Evidence-Based Manager
- Decision Awareness: Types of Managerial Decisions and Evidence-Based Processes
- Finding, Interpreting, and Using Scientific Evidence as Managers (Critically Appraised Topics or CATs)
- Improving and Using Organizational Data: Creating Valid Information and Useful Knowledge from Raw Data
- Making it Easier to Use Evidence as a Manager: Logic Models, Decision Aids and Communities of Practice
- Planning Your On-Going Development as an EBMgr

Learning Objectives:

1. Gain awareness of what EBMgt is, its four basic facets, and how they apply across a variety of organizational decisions.

2. Develop the skills to identify, access, and use quality evidence particularly from scientific research in making better business and organizational decisions.
3. Learn to use decision aids and logic models to improve use of information and the quality of resulting decisions.
4. Lay the foundation for continued practice of evidence-based management after graduation, and as new technology and scientific findings develop.

#### **Language Acquisition and Technology (82-888 C)**

**Jones**

Language Acquisition and Technology is a course that surveys technologies currently in use in language instruction, and will be delivered using an important subset of those technologies under student management. The course consists primarily of four components: 1) creating digital media and integrating it into instruction; 2) creating and deploying technology-enhanced learning sequences based on principles derived from instructional design and second language acquisition; 3) managing technology in an instructional environment; 4) evaluating existing technology-based learning materials and applications. Primary outcomes will be based in each of these four categories and include produced media, language courseware, technology training experience and a publishable review.

#### **Sensemaking: Cognitive, Social, and Technical Perspectives (05-899 A)**

**Nikki Kittur**

This is a seminar-style exploration that will focus on integrating knowledge from cognitive psychology, social psychology, social computing, machine learning and computer science that can help people make sense of overwhelming amounts of information.

The amount of information available to individuals today is enormous and rapidly increasing—70 billion hours are spent—and lost—every year on online sensemaking tasks (such as search) in the U.S. alone. Continued progress in science, education, and technology is fundamentally dependent on making sense of and finding insights in overwhelming amounts of data. However, human cognition, while unparalleled at discovering patterns and linking seemingly-disparate concepts, is also limited in the amount of information it can process at once.

This course will examine approaches that tackle sensemaking problems ranging from scientific collaboration to web search by combining the flexibility of higher-order cognition, the strengths of social collaboration, and the power of machine learning and visualization. Students will be exposed to theory about the social and cognitive processes involved in turning information into knowledge and how theory can be translated into practice through social computing, machine learning and visualization systems.

The material in this class would be of value to anyone interested in classic and cutting edge work representing cognitive, social, and computational approaches to helping people learn, understand, and discover insights that transform information into knowledge. These issues are relevant to students interested in domains including HCI, education, science, public policy, health, design, machine learning, social computing, and more.

You'll read about four articles to prepare for each week's class session. Papers have been selected either because they frame a sub-area, are one of the earliest, best papers in the sub-area, show cutting edge research or represent different approaches to the sub-area. While the course can't possibly cover every important paper that has been published in the last four decades, it will try to focus on pioneering work and the research traditions that have followed. We will try to cover enough areas to give a sense of the breadth of cross-disciplinary research on sensemaking. You will also participate in weekly in-class

exercises that will help translate theory into practice, and work on a final project which will allow you to go more in-depth in an area of your choosing.

### **Crowd Programming (05-899 C) Bigham**

Crowdsourcing and human computation are useful in a number of real-world applications. Crowds generate large data sets useful for natural language process and computer vision; they work together to formulate intelligent responses far beyond what we can automate; and they power intelligent interactive systems currently impossible with automated approaches alone. In this course, students will learn to program the crowd. They will write programs that work with existing sources of crowds (Amazon Mechanical Turk, oDesk, Facebook ...), apply usability principles for designing crowd tasks that elicit high-quality responses, use statistical methods to improve the quality of the work received, build systems that interface with crowd labor in real time, and conduct experiments to improve understanding of the differences between different sources of crowd work. Course work will consist of projects in each of these areas, and a final team project decided on by the students in each team.

### **Entrepreneurship (cross listed with ECE) (05-899 D) Engler**

Ever want to start a company? Thinking about commercializing an innovation? Want to know what VCs really think? Do you have what it takes to be an entrepreneur? Then this is the class for you. Entrepreneurship and Innovation in Technology is an introductory course in entrepreneurship for graduate students. The course targets non-business students and assumes no background in business. Students are exposed to fundamental concepts and issues around innovation and entrepreneurship. The course provides a foundation for starting a new venture and innovating new technologies and products within existing organizations. Topics covered will include: identifying a business opportunity, acquiring customers, building a team, developing a business model, understanding investment, managing risk, and achieving differentiation. Emphasis will be on team projects, including developing an investor pitch for an original idea.

### **PSY 2477 Design of Educational Systems @ Pitt Christian Schunn**

What is the origin of innovative educational solutions? It involves a systematic and systems-oriented approach to design. This class takes on real educational design problems from the Pittsburgh community (schools, museums, universities, companies). Students work in teams to develop innovative solutions to these problems, and learn about systematic and systems-oriented educational design. The teams are interdisciplinary, as good educational design teams must be, and the course welcomes doctoral students from all areas. Students are assigned to projects as a function of experience and interest. As clients are being recruited in the coming month, it would be very helpful if interested graduate students would let me know (schunn@pitt.edu) so that the right balance of projects will be organized.

### **Designing for Service (51-785)**

Technology has drastically changed society, and how we design needs to respond, too. Consider the experience of buying shoes. In past decades, before the advent of technology, customers went to a shoe store, were fitted by a clerk, and purchased shoes based on the stock in the store. Fast forward to today, where hundreds of brands and thousands of styles can be browsed online, shipped in 24 hours, and returned if less than perfect for free. The shoe purchase experience relies on system of services and products to satisfy one's needs and desires for new shoes. In this course, we will collectively define and study services and product service systems, and learn the basics of designing them. We will do this through lectures, studio projects, and verbal and written exposition. Classwork will be done individually and in teams. In some instances, we work with an external client to re-envision their core service offering.

### **Methodology of Visualization (51-831)**

This course emphasizes drawing exploration through methods of sketching, notation, and rapid visualization in context. Students will progress through a sequence of projects and exercises that apply healthy drawing practices of interpretation, expression and effect, perspective drawing, form development, and narrative. Throughout the semester, a variety of drawing and rendering techniques will be introduced to study and communicate subject matter. The drawing output within a project combines personal sketchbook studies with display pieces to share for critique. This course is intended for Masters students in HCII in the fall, and Masters students in Design in the spring; all other students by permission of the instructor.

### **Web Accessibility (05-897)**

Today's laws mandate reasonable attempts to meet accessibility, and today's designers help to enable or disable access. This mini will cover key concepts in computer accessibility, focusing particularly on the web.

- How people with disabilities view computers
- Design guidelines for accessibility
- Specific strategies for making your website accessible
- Analytics for web accessibility

### **Advanced Web Design (51-828)**

Advanced Web Design builds off of the fundamentals of Introduction to Web Design to make students more sophisticated web designers. Focusing on furthering skills beyond basic HTML5 and CSS3 and responsive design approaches, this course will also delve more deeply into web research and strategy; content development; hierarchy; design thinking; search engine optimization; and introduce students to the basics of PHP and javascript. Students will also gain a basic understanding of databases, work with content management systems, and design and develop for divergent platforms such as phones, tablets, and desktop computers. Students will develop advanced websites while mastering HTML5 and CSS3, looking at what is viable for implementation today as well as looking forward at what technology is reasonable in the near future of web design. Your own laptop is required, with the following software installed: Adobe CS6 or later, as well as other open-sourced software. This course is intended for MDES & MPS students in Design; all other students by permission of the instructor.

### **Designing Human Centered Software (05-891)**

This course introduces the skills and concepts of Human-Computer Interaction (HCI) that enable computer scientists to design systems that effectively meet human needs. A concrete illustration of the practice of HCI, this course covers iterative design processes, interactive prototype construction, discount evaluation techniques, and the historical context of HCI. The course is intended for undergraduates and graduate students not majoring in HCI.

### **Social Perspectives in HCI (05-772 A4)**

One of a series of four, seminar style mini-courses, to expose our PhD students to the breadth of classic and cutting edge research in four distinct traditions in HCII--computer science, cognitive science, social science, and design. Although no project is required for this course, there will be significant reading and writing. The four courses are:

- 05-772 Social Perspectives in HCI
- 05-773 Computer Science Perspectives in HCI
- 05-774 Cognitive Science Perspectives in HCI

- 05-775 Design Perspectives in HCI

### **95-760 Decision Making Under Uncertainty**

Managers in general, including information systems managers, constantly make decisions. Rarely are they lucky enough to have "full information ". Decision making under uncertainty is the norm. This class teaches a range of quantitative methods for making practical decisions under uncertainty, and in doing so gives an intense introduction into the art of mathematical modeling of business and social systems. The methods covered include forecasting, queuing theory and Monte Carlo simulation. Some deterministic optimization methods will also be covered. The emphasis will be on "end user modeling " that equips the students to use these methods to inform his or her own future decision making, but where appropriate will be extended to consider construction of decision support systems generally.

#### **Learning Objectives:**

1. Develop a conscience of linear optimization, network modeling, forecasting and queuing theory.
2. Develop techniques for solving LP problems in a spreadsheet and Network problems in spatial analysis and for doing LP sensitivity analysis.
3. Have confidence in the ability to perform simulation using 'Cristal Ball' and integer optimization.
4. Discuss heuristics and biases in decision making.

## Appendix B

### Highlighted University Resources for Graduate Students and The WORD. Student Handbook

#### **Key Offices for Graduate Student Support**

##### **Office of the Assistant Vice Provost for Graduate Education**

[www.cmu.edu/graduate](http://www.cmu.edu/graduate); [grad-ed@cmu.edu](mailto:grad-ed@cmu.edu)

The Office of the Assistant Vice Provost for Graduate Education, AVPGE, directed by Suzie Laurich-McIntyre, Ph.D., Assistant Vice Provost for Graduate Education, provides central support for graduate students in a number of roles. These include: being an ombudsperson and resource person for graduate students as an informal advisor; resolving formal and informal graduate student appeals; informing and assisting in forming policy and procedures relevant to graduate students; and working with departments on issues related to graduate students and implementation of programs in support of graduate student development.

The Office of the AVPGE often partners with the division of Student Affairs to assist graduate students with their Carnegie Mellon experience. Senior members of the student affairs staff are assigned to each college (college liaisons) and are often consulted by the Assistant Vice Provost for Graduate Education and departments on an individual basis to respond to graduate student needs.

The Office of the Assistant Vice Provost for Graduate Education (AVPGE) offers a robust schedule of professional development opportunities. Some are geared towards a specific population (master's students, PhD students at the beginning of their program, graduate students seeking tenure track positions, etc.) and others are open to all graduate students (time management, balancing, staying healthy). A full schedule of programs can be found at: <http://www.cmu.edu/graduate/>.

The Office of the AVPGE also coordinates several funding programs, and academically focused seminars and workshops that advise, empower and help retain all graduate students, particularly graduate students of color and women in the science and technical fields. The fundamental goals of our programs have been constant: first, to support, advise and guide individual graduate students as they work to complete their degrees; second, to contribute to the greatest degree possible to the diversification of the academy. Visit the Graduate Education website for information about:

- Conference Funding Grants
- Graduate Small Project Help (GuSH) Research Funding
- Graduate Student Professional Development: seminars, workshops and resources
- Graduate Women Gatherings (GWG)
- Inter-university Graduate Students of Color Series (SOC)

## **Office of the Dean of Student Affairs**

[www.cmu.edu/student-affairs/index.html](http://www.cmu.edu/student-affairs/index.html)

The Office of the Dean provides central leadership of the metacurricular experience at Carnegie Mellon. The offices that fall under the division of Student Affairs led by Vice President and Dean of Student Affairs Gina Casalegno, include (not an exhaustive list):

- Career and Professional Development Center
- Cohon University Center
- Counseling & Psychological Services (CAPS)
- Dining Services
- Housing Services
- Office of Integrity and Community Standards
- Office of International Education (OIE)
- Student Activities
- University Health Services

Graduate students will find the enrollment information for **Domestic Partner Registration** and **Maternity Accommodations** in the Office of the Dean of Student Affairs and on the website. The Office of the Dean of Student Affairs also manages the **Emergency Student Loan** (ESLs) process. The Emergency Student Loan service is made available through the generous gifts of alumni and friends of the university. The Emergency Student Loan is an interest-free, emergency-based loan repayable within 30 days. Loans are available to enrolled students for academic supplies, medication, food or other expenses not able to be met due to unforeseeable circumstances. The Office of Integrity and Community Standards also provides consultation, support, resources and follow-up on questions and issues of Academic Integrity: [www.cmu.edu/academic-integrity](http://www.cmu.edu/academic-integrity).

## **Assistance for Individuals with Disabilities**

[www.cmu.edu/hr/eos/disability/](http://www.cmu.edu/hr/eos/disability/)

Students with disabilities are encouraged to self-identify with Equal Opportunity Services by contacting Larry Powell, 412-268-2013, [lpowell@andrew.cmu.edu](mailto:lpowell@andrew.cmu.edu) to access the services available at the university and initiate a request for accommodations.

## **Eberly Center for Teaching Excellence & Educational Innovation**

[www.cmu.edu/teaching](http://www.cmu.edu/teaching)

Support for graduate students who are or will be teaching is provided in many departments and centrally by the Eberly Center for Teaching Excellence & Educational Innovation. The Eberly Center offers activities for current and prospective teaching assistants as well as any graduate students who wish to prepare for the teaching component of an academic career. The Center also assists departments in creating and conducting programs to meet the specific needs of students in their programs. Specific information about Eberly Center support for graduate students can be found at: [www.cmu.edu/teaching/graduatestudentsupport/index.html](http://www.cmu.edu/teaching/graduatestudentsupport/index.html).

### **Carnegie Mellon Ethics Hotline**

The health, safety and well-being of the university community are top priorities at Carnegie Mellon University. CMU provides a hotline that all members of the university community should use to confidentially report suspected unethical activity relating to financial matters, academic and student life, human relations, health and campus safety or research.

Students, faculty and staff can anonymously file a report by calling 877-700-7050 or visiting [www.reportit.net](http://www.reportit.net) (user name: tartans; password: plaid). All submissions will be reported to appropriate university personnel.

**The hotline is NOT an emergency service. For emergencies, call University Police at 412-268-2323.**

### **Graduate Student Assembly**

[www.cmu.edu/stugov/gsa/index.html](http://www.cmu.edu/stugov/gsa/index.html)

The Carnegie Mellon Student Government consists of an Executive Branch and a Legislative Branch. This is the core of traditional student government, as governed by the Student Body Constitution. The Executive Branch serves the entire student body, graduate and undergraduate, and consists of one president and four vice-presidents. The Legislative Branch for graduate students, The Graduate Student Assembly (GSA) passes legislation, allocates student activities funding, advocates for legislative action locally and in Washington D.C. on behalf of graduate student issues and needs, and otherwise acts on behalf of all graduate student interests. GSA also contributes a significant amount of funding for conferences and research, available to graduate students through application processes managed by the Office of the Assistant Vice Provost for Graduate Education. GSA also plans various social opportunities for graduate students and maintains a website of graduate student resources on and off-campus, [www.cmu.edu/stugov/gsa/Resources](http://www.cmu.edu/stugov/gsa/Resources). Each department has representation on GSA and receives funding directly from GSA's use of the student activities fee for departmental activities for graduate students. The department rep(s) is the main avenue of graduate student representation of and information back to the graduate students in the department.

### **Intercultural Communication Center (ICC)**

[www.cmu.edu/icc/](http://www.cmu.edu/icc/)

The Intercultural Communication Center (ICC) is a support service offering both credit and non-credit classes, workshops, and individual appointments designed to equip nonnative English speakers (international students as well as international students who attended high school and/or undergraduate programs in the U.S.) with the skills needed to succeed in academic programs at Carnegie Mellon. In addition to developing academic literacy skills such as speaking, reading and writing, students can learn more about the culture and customs of the U.S. classroom. The ICC also helps international teaching assistants (ITAs) who are non-native English speakers develop fluency and cultural understanding to teach successfully at Carnegie Mellon and provides ITA testing, required testing indicating a nonnative speaking student has a language proficiency required before being allowed to work with undergraduates in classes, labs or individual meetings.



### **Office of International Education (OIE)**

[www.studentaffairs.cmu.edu/oie/](http://www.studentaffairs.cmu.edu/oie/)

Carnegie Mellon hosts international graduate and undergraduate students who come from more than 90 countries. Office of International Education (OIE) is the liaison to the University for all non-immigrant students and scholars. OIE provides many services including: advising on personal, immigration, academic, social and acculturation issues; presenting programs of interest such as international career workshops, tax workshops, and cross-cultural and immigration workshops; supporting international and cultural student groups such as the International Student Union and the International Spouses and Partners Organization; maintaining a resource library that includes information on cultural adjustment, international education and statistics on international students in the United States; posting pertinent information to students through email and the OIE website, and conducting orientation programs.

### **Veterans and Military Community**

<http://www.cmu.edu/veterans/>

Military veterans are a vital part of the Carnegie Mellon University community. Graduate students can find information on applying veteran education benefits, campus services, veteran's groups at CMU, non-educational resources and international military service information through the Veterans and Military Community website. There are also links and connections to veteran resource in the Pittsburgh community. The Naval ROTC and Veteran Affairs Offices are located at 4615 Forbes Avenue, [uro-vaedbenefits@andrew.cmu.edu](mailto:uro-vaedbenefits@andrew.cmu.edu), 412-268-8747.

### **Key Offices for Academic & Research Support**

#### **Computing and Information Resources**

[www.cmu.edu/computing](http://www.cmu.edu/computing)

Computing Services provides a comprehensive computing environment at Carnegie Mellon. Graduate students should seek Computing Services for information and assistance with your Andrew account, network access, computing off-campus, campus licensed software, email, calendar, mobile devices, computer security, cluster services and printing. Computing Services can be reached at [it-help@cmu.edu](mailto:it-help@cmu.edu).

The Carnegie Mellon Computing Policy establishes guidelines and expectations for the use of computing, telephone and information resources on campus. The policy is supported by a number of guidelines graduate students should know. The policy and guidelines are available at: [www.cmu.edu/computing/guideline/index.html](http://www.cmu.edu/computing/guideline/index.html).

#### **Research at CMU**

[www.cmu.edu/research/index.shtml](http://www.cmu.edu/research/index.shtml)

The primary purpose of research at the university is the advancement of knowledge in all fields in which the university is active. Research is regarded as one of the university's major contributions to society and as an essential element in education, particularly at the graduate level and in faculty development. Research activities are governed by several university

policies. Guidance and more general information is found by visiting the Research at Carnegie Mellon website.

### **Office of Research Integrity & Compliance**

[www.cmu.edu/research-compliance/index.html](http://www.cmu.edu/research-compliance/index.html)

The Office of Research Integrity & Compliance (ORIC) is designed to support research at Carnegie Mellon University. The staff work with researchers to ensure research is conducted with integrity and in accordance with federal and Pennsylvania regulation. ORIC assists researchers with human subject research, conflicts of interest, responsible conduct of research, export controls, intellectual property rights and regulations, and institutional animal care & use. ORIC also consults on, advises about and handles allegations of research misconduct.

### **Key Offices for Health, Wellness & Safety**

#### **Counseling & Psychological Services**

[www.studentaffairs.cmu.edu/counseling](http://www.studentaffairs.cmu.edu/counseling)

Counseling & Psychological Services (CAPS) affords the opportunity for students to talk privately about issues that are significant for them in a safe, confidential setting. Students sometimes feel confused about why they are feeling upset and perhaps confused about how to deal with it. An initial consultation with a CAPS therapist will clarify options and provide a recommendation to the appropriate mental health resource at Carnegie Mellon or the larger Pittsburgh community. CAPS services are provided at no cost. Appointments can be made in person or by telephone, 412-268-2922.

#### **Health Services**

[www.cmu.edu/HealthServices/](http://www.cmu.edu/HealthServices/)

University Health Services (UHS) is staffed by physicians, advanced practice clinicians and registered nurses who provide general medical care, allergy injections, first aid, gynecological care and contraception as well as on-site pharmaceuticals. The CMU student insurance plan covers most visit fees to see the physicians and advanced practice clinicians & nurse visits. Fees for prescription medications, laboratory tests, diagnostic procedures and referral to the emergency room or specialists are the student's responsibility and students should review the UHS website and their insurance plan for detailed information about the university health insurance requirement and fees. UHS also has a registered dietician and health promotion specialists on staff to assist students in addressing nutrition, drug and alcohol and other healthy lifestyle issues. In addition to providing direct health care, UHS administers the Student Health Insurance Program. The Student Health Insurance plan offers a high level of coverage in a wide network of health care providers and hospitals. Graduate students should contact UHS to discuss options for health insurance for spouses, domestic partners and dependents. Appointments can be made by visiting UHS's website or by telephone, 412-268-2157.

#### **University Police**

<http://www.cmu.edu/police/>

412-268-2323 (emergency only), 412-268-6232 (non-emergency)

The University Police Department is located at 300 South Craig Street, Room 199 (entrance is

on Filmore Street). The department's services include police patrols and call response, criminal investigations, shuttle and escort services, fixed officer and foot officer patrols, event security, and crime prevention and education programming. Visit the department's website for additional information about the staff, escort and shuttle, emergency phone locations, crime prevention, lost and found, finger print services, and annual statistic reports.

### Shuttle and Escort Services

University Police coordinates the Shuttle Service and Escort Service provided for CMU students, faculty, and community. Full information about these services, stops, routes, tracking and schedules can be found online at: <http://www.cmu.edu/police/shuttleandescort/>

Carnegie Mellon University publishes an annual campus security and fire safety report describing the university's security, alcohol and drug, sexual assault, and fire safety policies and containing statistics about the number and type of crimes committed on the campus and the number and cause of fires in campus residence facilities during the preceding three years. Graduate students can obtain a copy by contacting the University Police Department at 412-268-6232. The annual security and fire safety report is also available online at [www.cmu.edu/police/annualreports](http://www.cmu.edu/police/annualreports).

### The WORD

<http://www.cmu.edu/student-affairs/theword//>

The WORD is Carnegie Mellon University's student on-line handbook and is considered a supplement to the department (and sometimes college) handbook. The WORD contains campus resources and opportunities, academic policy information and resources, community standards information and resources. It is designed to provide all students with the tools, guidance, and insights to help you achieve your full potential as a member of the Carnegie Mellon community. Information about the following is included in The WORD (not an exhaustive list) and graduate students are encouraged to bookmark this site and refer to it often. University policies can also be found in full text at: <http://www.cmu.edu/policies/>.

Carnegie Mellon Vision, Mission

Carnegie Code

Academic Standards, Policies and Procedures

Educational Goals

Academic and Individual Freedom

Statement on Academic Integrity

Standards for Academic & Creative Life

Assistance for Individuals with Disabilities

Master's Student Statute of Limitations

Conduct of Classes

Copyright Policy

Cross-college & University Registration

Doctoral Student Status Policy

Evaluation & Certification of English Fluency for Instructors

- Final Exams for Graduate Courses
- Grading Policies
- Intellectual Property Policy
- Privacy Rights of Students
- Research
  - Human Subjects in Research
  - Office of Research Integrity & Compliance
  - Office of Sponsored Programs
  - Policy for Handling Alleged Misconduct of Research
  - Policy on Restricted Research
- Student's Rights
- Tax Status of Graduate Student Awards

#### Campus Resources & Opportunities

- Alumni Relations
- Assistance for Individuals with Disabilities
- Athletics, Physical Fitness & Recreation
- Carnegie Mellon ID Cards and Services
- Cohon University Center
- Copying, Printing & Mailing
- Division of Student Affairs
- Domestic Partner Registration
- Emergency Student Loan Program
- Gender Programs & Resources
- Health Services
- Dining Services
- The HUB Student Services Center
- ID Card Services
- Leonard Gelfand Center
- LGBTQ Resources
- Multicultural and Diversity Initiatives
- Opportunities for Involvement
- Parking and Transportation Services
- SafeWalk
- Survivor Support Network
- Shuttle and Escort Services
- Spiritual Development
- University Police
- Student Activities
- University Stores

#### Community Standards, Policies and Procedures

- Alcohol and Drugs Policy
- AIDS Policy

Bicycle/Wheeled Transportation Policy  
Damage to Carnegie Mellon Property  
Deadly Weapons  
Discriminatory Harassment  
Disorderly Conduct  
Equal Opportunity/Affirmative Action Policy  
Freedom of Expression Policy  
Health Insurance Policy  
Immunization Policy  
Missing Student Protocol  
Non-Discrimination Policy  
On-Campus Emergencies  
Pets  
Political Activities  
Recycling Policy  
Riotous and Disorderly Behavior  
Safety Hazards  
Scheduling and Use of University Facilities  
Sexual Harassment and Sexual Assault Policy  
Smoking Policy  
Student Accounts Receivable and Collection Policy and Procedures  
Student Activities Fee  
Student Enterprises  
Workplace Threats and Violence Policy

Statement of Assurance

Last updated: June 14, 2016

# Human-Computer Interaction Program Proposal for Independent Study

Approval and Registration Instructions

	<i>Type</i>	<i>Course</i>	<i>Approved By</i>	<i>Deliver Form to</i>	<i>Room</i>
Undergrads	Independent	05- <u>589</u>	Vincent Aleven	Indra Danti	NSH 3607
Graduates (M)	Independent	05- <u>689</u>	Nicole Willis	Nicole Willis	SCRG 209
Graduates (M)	Small Group	05- <u>688</u>	Nicole Willis	Nicole Willis	SCRG 209
Graduates (METALS)	Independent	05-680	Michael Bett	Michael Bett	NSH 2602F
Graduates (PhD)	Independent	05- <u>689</u>	Scott Hudson	Queenie Kravitz	NSH 3511

**Student Name** \_\_\_\_\_

**Student Andrew ID** \_\_\_\_\_

- Course Number** (circle one)
- 05-688 Graduate-Small Group
  - 05-689 Graduate-Independent Study
  - 05-589 Undergraduate

**Units** \_\_\_\_\_

**Semester** \_\_\_\_\_

**Instructor(s)** \_\_\_\_\_

**Instructor(s) email** \_\_\_\_\_

**Instructor(s) phone** \_\_\_\_\_

**Subject Area** \_\_\_\_\_

**Proposal** Write a very brief (several lines) description of proposal below. Complete description of independent study project must be written in detail and attached to this page.

\_\_\_\_\_  
 \_\_\_\_\_

**Deliverables** \_\_\_\_\_

\_\_\_\_\_

**Due Date** \_\_\_\_\_  
 (date of Final Deliverable should be at least one week before deadline for submission of final grades)

I agree to oversee the above-described independent study and deliver the final grade to the HCI program administrator on or before the above date.

**Instructor** \_\_\_\_\_  
 Signature  Date

I agree to complete the described Independent Study and deliver the final module by the above date.

**Student** \_\_\_\_\_  
 Signature  Date

**HCI Program Advisor** \_\_\_\_\_  
 Signature  Date

## METALS Capstone Project Gift Card Purchase and Use Procedure

Last Updated April 7, 2016

METALS students who need gift cards to pay project participants should contact Lauren Hardwig at [lhardwig@cs.cmu.edu](mailto:lhardwig@cs.cmu.edu) (Gail Kusbit [gkusbit@cs.cmu.edu](mailto:gkusbit@cs.cmu.edu) is back-up) to request that she purchase cards.

### General guidelines:

- Gift cards may be requested multiple times throughout the year, but please group your requests together to minimize the number of purchases and effort required.
- Gift cards may only be given to participants **after they have completed their participation** in your project (or that particular part of your project for which you have offered the specific card).
- Suggested hourly rates: \$20 -\$25 for teachers/professionals, \$15 for non-professionals and students grades 6-12, and \$10 for younger children.
- Use the attached forms to request and keep track of your individual participants and how much each receives —do not go over \$74/year to any one participant. (\$75 or more causes a taxable event).
- A bulk gift card purchase of **more than \$500** requires that you get prior approval from your faculty advisor or the METALS director.

### VIRTUAL GIFT CARD PROCEDURE (request virtual cards only **after** your participants have finished participating):

- ✓ When asking Lauren Hardwig to purchase virtual cards for your project, please email her the completed **METALS Capstone Project Virtual Gift Card Purchase Form**.
- ✓ If the purchase is more than \$500, provide Lauren Hardwig with email approval from your advisor or the METALS Director.
- ✓ Lauren Hardwig will purchase the virtual cards and have them sent by email directly to your recipients.

### PHYSICAL GIFT CARD PROCEDURE (OK to request physical cards **before or after** your participants have participated):

- ✓ When asking Lauren Hardwig to purchase physical cards for your project, please email her the completed **METALS Capstone Project Physical Gift Card Purchase Request Form**.
- ✓ Lauren Hardwig will purchase the cards and notify you by email when they come in.
- ✓ The team member picking up the cards will sign for the cards.
- ✓ Have your project recipients sign the **METALS Capstone Project Physical Gift Card Distribution Form** when they receive their physical cards.
- ✓ When you've finished distributing your physical cards, return the **METALS Capstone Project Physical Gift Card Distribution Form** signature sheet to Jo for her records. Return any un-distributed gift-cards to Lauren Hardwig at that time as well. She will hold these for any future needs your project or another project may have.

## METALS Capstone Project Virtual Gift Card Purchase Form

Project:

Your Name:

Date of request:

Faculty Sponsor:

Your Email:

	<b>Recipient's Name</b>	<b>Recipient email address</b>	<b>Recipient's Affiliation (i.e. Steel Valley SD teacher, UPMC doctor, retired teacher, etc)</b>	<b>Interview Date</b>	<b>Gift Card type requested (i.e. Amazon, Starbucks)</b>	<b>\$ Amount</b>
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						



# METALS Capstone Project Physical Gift Card Purchase Request Form

Project:

Your Name:

Date of Request:

Faculty Sponsor:

Your Email:

Total \$ Request:

	Card type	# of cards	\$ amount of card	\$ total
1				
2				
3				
4				
5				
6				
7				
8				

**GIFT CARD RECEIPT**

I, \_\_\_\_\_ under the direction of \_\_\_\_\_  
 Signature When Receiving Giftcards Faculty Sponsor

for \_\_\_\_\_ do acknowledge that I am assuming responsibility for the management  
 METALS Project Name

of the gift cards indicated above. Total \$ amount (all cards) received: \_\_\_\_\_

**RECONCILING GIFT CARD REQUEST FOR METALS PROJECT PARTICIPANTS**

Total Gift Cards Returned (**# of cards and total \$ amount**): \_\_\_\_\_

Total Amount in Receipts: \_\_\_\_\_ Date Reconciled: \_\_\_\_\_

PRINT NAME \_\_\_\_\_  
 METALS Student who Accepted Gift Cards

SIGNATURE \_\_\_\_\_  
 METALS Student who Accepted Gift Cards

I have done a financial audit on the METALS gift card request and verify that a combination of participants and gift cards being returned to me today equal the original amount requested.

\_\_\_\_\_  
 METALS Department Administrator

\_\_\_\_\_  
 DATE

## METALS Capstone Project Physical Gift Card Distribution Form

Project:

Your Name:

Faculty Sponsor:

Your Email:

	Name (please print)	Signature	Date	Amount received/Card type
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				