School of Informatics PRAC Report
2009-2010

Introduction

During 2009-2910, the School of Informatics initiated a focused review of its undergraduate programs through the creation of six committees, operating under an umbrella Executive Council for Undergraduate Education (CUE). Those committees were:

1. Teaching and Assessment
2. RISE
3. Graduation Management and Retention
4. Distance Education
5. Recruitment and Marketing
6. Informatics Curriculum Development

The Executive Council provided a charter for each committee and named both an administrative and faculty co-chair. Each member of the Informatics faculty has participated in one or more of these committees, which will operate through the end of 2011 and then cease to exist. This concentrated attention is designed to acknowledge the importance of the School's undergraduate work and the need to build processes, in this relatively new School, that provide true accountability for student learning and programmatic outcomes.
Institutionalization of the PUL assessment process is now in evidence throughout the School. Steps this year included:

1. Completion of the PUL matrices for each undergraduate program by the October 30, 2009 deadline; identification of the courses to be assessed in Spring 2010 and training of all faculty involved in that first assessment; creation of an online lecture documenting the initiative for the benefit of adjuncts and faculty who wish to learn more about the process
2. Delineation of a departmental workflow attached to this process which includes actions to be taken by student services, program directors, faculty and administration
3. Compilation of a large archive of PUL rubrics into an Adobe portfolio, now available on an Oncourse Faculty worksite; faculty will add the rubrics they develop to assess the PULs to the portfolio as they develop ones specific to each program

4. Review of the campus-wide "Assessment at IUPUI 2008-2009" Annual Report by the Teaching and Assessment Committee and its implications for improved reporting in Informatics

Finally, working in consultation with IMIR staff, the administration of the School adopted a new format for its yearly PRAC report, which will include cumulative high level outcome measures "at a glance," followed by two to three specific assessment projects per program in the campus format.

School of Informatics Undergraduate Outcome Measures										
	Credit Hours*	**Degrees Awarded*****	**Certificates Awarded**	**Retention Freshman-Sophomore**	**Retention Junior-Senior**	**Percentage of Under-represented Minorities********	**Percentage of Female Majors*****	**Grad School Acceptance**	**Percentage Of Graduates Employed**	**Average Salary**
2008-2009	9795	109	5	82%	88%	17.4 (21.9)	38.6 (38.9)	18.75%	65%	24-74 K
2009-2010	9405	69	1	N/A IMIR	N/A IMIR	19.7 (24.4)	37 (37)	17%	56%	45,250
2010-2011										

*Credit hours, degrees awarded, certificates awarded, retention, minorities, female majors and, for HIA, registry exam information and percent employed calculated by fiscal year; grad school acceptances, non-HIA percent employed and average salary by academic year

**Students who will complete their degrees in June 2010 are not included. The School anticipates that 32 undergraduate and six graduate students will finish in June.

**There are two sets of percentages for Under-Represented Minorities and Female majors. The first percentage is from IMIR; the second, in parentheses is from the School's internal database. In IMIR, the population of international students is counted as a separate category, so the ethnicity of international students is not included. International students are included in the School's internal database of minorities. Underrepresented minorities includes African-American, Asian/Pacific Islander, Hispanic/Latino, Native American, all others; it excludes those students who declined to indicate their status.

School of Informatics Graduate Program Outcome Measures									
	Credit Hours*	**Degrees Awarded Masters****	**Degrees Awarded PhD**	**Certificates Awarded**	**Percentage of Under-represented Minorities*****	**Percentage of Female Majors*****	**Percentage of Graduates Employed**	**Average Salary**	**PhD Program Acceptances**
2008-2009	1677	33	0	1	15.9 (44.2)	33.8 (35.7)	80%	23 – 45 K	N/A
2009-2010	2074	24	1	1	16 (44.9)	31.8 (32.3)	77%	57,750	N/A
2010-2011									

*Credit hours, degrees awarded, certificates awarded, retention, minorities, female majors and, for HIA, registry exam information and percent employed calculated by fiscal year; grad school acceptances, non-HIA percent employed and average salary by academic year

**Students who will complete their degrees in June 2010 are not included. The School anticipates that 32 undergraduate and six graduate students will finish in June

**There are two sets of percentages for Under-Represented Minorities and Female majors. The first percentage is from IMIR; the second, in parentheses is from the School's internal database. In IMIR, the population of international students is counted as a separate category, so the ethnicity of international students is not included. International students are included in the School's internal database of minorities. Underrepresented minorities includes African-American, Asian/Pacific Islander, Hispanic/Latino, Native American, all others; it excludes those students who declined to indicate their status.

Program Specific Assessments for the School of Informatics (SoI)

UNDERGRADUATE PROGRAMS

SoI - HIA BS Program							
	Degrees Awarded	**Certificates Awarded**	**Percentage Passing Registry Examination**	**Continued Accreditation**	**Percent Employed**	**Average Salary**	**Grad School Placement**
2008-2009	**27**	**5**	**61%**	Yes	**92.86%**	**35 – 45 K**	**1**
2009-2010	**2**	**1**	**50%**	Yes	**66%**	**42,000**	
2010-2011							

Results of 2009-2010 assessment of learning outcomes assessment

A. Results of Assessment Project One – Improve graduate RHIA examination scores in all 5 Domains

a) What general outcome are you seeking?
To improve HIA graduate scores on the national Registered Health Information Administrator (RHIA) credentialing examination.

b) How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)
Graduates RHIA examination scores will be at or above the national average on the competency areas in which HIA graduates have previously scored lower than the national average.

c) What opportunities do students have to learn it? (in class or out of class)
The HIA program is accredited through the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM). CAHIIM is an independent accrediting organization for degree-granting programs. CAHIIM accredited programs are required to educate students in the following Domains developed by the American Health Information Management Association:

I. Health Data Management
II. Health Statistics, Biomedical Research and Quality Management
III. Health Services Organization and Delivery
IV. Information Technology and Systems

V. Organization and Management

HIA students are prepared to take the RHIA exam through successful completion of course curriculum which is determined by the American Health Information Management Association's Model Curriculum for Baccalaureate Degree Program.

d) How are you measuring each of the desired behaviors listed in #1?

- Analysis of registry exam test results included on the American Health Information Management Association's School Score Report. The report is forwarded to the HIA Program Director on a quarterly basis.
- Analysis of course content during the HIA annual program evaluation conducted by faculty.

e) What are the assessment findings?

Analysis of the RHIA examination results indicate that graduates have improved scores in all but two domain areas. This is greatly improved from the previous exam scores in which students were below the national average more than 5 subdomains within the 5 Domains listed above.

f) What improvements have been made based on assessment findings?

Faculty has focused on revising course content in the domains graduates have previously scored lower than the national average in.

B. Results of Assessment Project Two – Revise HIA Pre-requisite course offerings

a) What general outcome are you seeking?

To further refine the pre-HIA curriculum to insure that pre-HIA students are prepared for the core courses offered within the HIA professional program.

b) How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)

- Through knowledge assessments (exams)
- Minimum grade requirement of a C or better for pre-requisite courses

c) What opportunities do students have to learn it? (in class or out of class)

Through the Pre-HIA curriculum

d) How are you measuring each of the desired behaviors listed in #2?

- Assessment examinations
- GPA
- Successful completion of the pre-HIA curriculum prior to beginning the core courses in the HIA professional program

e) What are the assessment findings?

- Students are better prepared and perform at a higher level in the HIA professional program if they receive a C or better in the pre-requisite courses.

f) What improvements have been made based on assessment findings?

- Newly developed courses have been added to the HIA pre-requisite Plan of Study beginning fall 2010.
- Students must complete all pre-requisites before being accepted into the HIA professional program.

C. Results of Assessment Project Three – Develop a new Professional Practice Experience (PPE) model

a) What general outcome are you seeking?

Development of a more effective PPE course model for HIA students

b) How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)

Students will obtain advanced skill-sets required upon graduation to become functional workforce members. This will take place through participation in advance level projects, case studies, seminars and clinical experience designed to build upon knowledge gained through previous coursework.

c) What opportunities do students have to learn it? (in class or out of class)

In-class practicum's taught by HIA faculty in their specific areas of expertise focusing on hands-on tasks and projects as well as experience in a clinical setting.

d) How are you measuring each of the desired behaviors listed in #2?

- Knowledge assessments.
- Individual evaluation of each student by clinical instructor.
- Through graduate and PPE clinical instructor surveys.

e) What are the assessment findings?

The PPE needed to be improved in order to increase the graduates knowledge and skill-set for better work force preparedness.

f) What improvements have been made based on assessment findings?

Four new courses have been developed to begin for the fall 2010-2011 academic year:

- M441 – Transitional Professional Practicum for Health Information Management I
- M442 – Transitional Professional Practicum for Health Information Management II
- M443 – Professional Practicum in Health Information Management I
- M444 – Professional Practicum in Health Information Management II

M441 and M442 are courses designed for students who have completed an Associate Degree (AS) from a CAHIIM accredited program. The IU HIA program has worked with the Program Director from these programs to develop an articulation agreement between the schools.

M443 and M444 are courses designed to provide professional practice experience to the student that has not completed courses in an Associate Degree program. All four courses have been developed to provide hands-on experience with an approved facility through didactic and practicum experience in the classroom.

Three projects for the coming year:

- Assessment project one- Assess graduate's proficiency in the HIA Baccalaureate Degree Entry-Level Competencies as outlined by the American Health Information Management Association
- Assessment project two - Assess graduate employment performance
- Assessment project three - Assess Professional Practice Experience (PPE) revised model

SoI – Informatics BS Program					
	Degrees Awarded	**Certificates Awarded**	**Percent Employed**	**Average Salary**	**Grad School Acceptances**
2008-2009	**16**	**0**	**64%**	**24 – 74 K**	**29%**
2009-2010	**12**	**0**	**86%**	**42,000**	**14%**
2010-2011					

Results of 2009-2010 assessment of learning outcomes assessment

A. Campus Wide PUL Assessment Process

a) What general outcome are you seeking?
Effective implementation of the campus-wide PUL assessment process

b) How would you know the outcome if you saw it? (What will the faculty know or be able to do?)
Faculty will be able to follow procedures mandated by campus policy beginning in Spring Semester 2010 and successfully document their students' attainment of the PULs in the new Oncourse tool

c) What opportunities do faculty members have to learn it?
Two twenty-minute updates were provided on the overall process at Faculty meetings; a mandatory one hour session was provided for faculty assessing in Spring Semester 2010

d) How are you measuring each of the desired behaviors listed in b?
Attendance at the mandatory session; faculty ability to upload PUL data correctly at the conclusion of spring semester

e) What are the assessment findings?
Ninety percent of the faculty members were able to record their students' attainment of the PULs successfully. There was one error in coding for a class that was scheduled for assessment, so, even though findings had been recorded, there was no ability to upload those findings in the Oncourse tool; another faculty member, traveling in Kenya, had to wait to return home to upload her findings

f) What improvements have been made based on assessment findings?
The mandatory PUL one hour training has been recorded and placed online for the use of all full time and adjunct faculty.

B. Results of Assessment Project Two (CUE Committee on Informatics Curriculum Development)

a) What general outcome are you seeking?

Informatics undergraduate students take only 37 hours of their classes inside the School; the rest are distributed to other units on campus. This has made it difficult for students to take on a professional identity in a field that is new and still be defined. An intervention is needed to bring these students together to form a more identifiable cohort and sense of group identity

b) How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)

The student will take more required courses inside the School, contributing to a sense of identification with the major

c) What opportunities do students have to learn it? (in class or out of class)

The CUE Informatics undergraduate curriculum committee, meeting throughout the year, has increased the number of required hours within the school from 49 to 62 and made additional courses considered essential as the major has developed available

d) How are you measuring each of the desired behaviors listed in #2?

Student exposure to and time in the major will increase by 21%.

e) What are the assessment findings?

The new curriculum will be implemented Fall Semester of 2010

f) What improvements have been made based on assessment findings?

New courses were added at the undergraduate level in research, project management, data structures and data management

SoI - Media Arts and Science BS Program					
	Degrees Awarded	**Percent Employed**	**Average Salary**	**Accreditation**	**Grad School Acceptances**
2008-2009	**66**	**68%**	**42,223**	Under consideration	**20%**
2009-2010	**55**	**49%**	**50,667**		**20%**
2010-2011					

Results of 2009-2010 assessment of learning outcomes assessment

A. Assessment Project: The 2010 Curriculum.

In the MAS program, students study the use of digital media to communicate, educate, engage, or entertain. The program addresses digital storytelling at both the conceptual level and the level of hands-on production-based skills. Our goal is to produce well-rounded professionals who understand digital media as an effective form of communication, who are skilled at using the tools and techniques involved in content creation, and who can communicate and work as a member of a team. MAS faculty in 2008-2009 observed that the program had drifted towards over-emphasizing production. Members of our local Media Advisory Board agreed. This drift is not surprising – as software packages become more powerful they also become more complex and thus more time-consuming to teach and learn. Starting in 2008, the MAS faculty reviewed the curriculum and made several improvements, resulting in the 2010 Curriculum. Overall requirements for the program were made more flexible, and some skill-oriented courses were consolidated. These changes made room for new coursework in teamwork, creativity, and critical thinking. We also laid the groundwork for having our students create Portfolios of their work, starting in the introductory courses NEWM-N101 and NEWM-N102. These courses are very skill-oriented, but students will also be required to create websites where they use their new skills to communicate about themselves to the MAS community (see below for more). Finally, the faculty generated a set of MAS-specific Program Outcomes, along with a mapping to the more general IUPUI PULs.

B. **Assessment Project: Capstone Websites (phase 1).**

In the MAS program, students produce a final project as the capstone of their academic career in the class NEWM-N499. In this assessment project, the MAS program is using the capstone experience as a venue to assess our students' ability to communicate, in written and mixed-media formats, about themselves and their work (PUL 1A). It is our goal that MAS students are able to present a synopsis of their project, explain why it's interesting, outline their production process, note challenges, and share reflections on what they learned. These skills are introduced in a number of earlier classes. They are re-visited in the capstone class (PUL 1A has Moderate emphasis in this class) through planning documents that require them to provide an abstract of their project. Students are also provided with a list of topics to cover as they put together the story about their project.

In the past, students have presented this information in traditional poster form and we have assessed their ability to communicate by evaluating the overall quality of the poster, looking at the content (both ideas and grammar) and the poster's physical form. Although some posters were very good, in many cases the poster was only moderately effective. This past year, we concluded that the posters were perhaps not the best medium for our students, since our program de-emphasizes printed media in favor of on-line interactive documents. In Spring 2010, we moved away from posters and required students to build a website to communicate about their project. Each student was required to flesh out a template using the same list of topics that had traditionally been presented on the posters. Our goals for this phase of the project were modest: generate a usable template, work out some logistics, and assess whether a switch to websites would be feasible. We did find that all capstone students produced a website. Informal assessment during the capstone gala showed that students generally seemed more engaged with their websites than they had been with the posters. Again informally, we know that many of the websites were created at the last minute. This project will continue next year, as described below.

Projects for the coming year:

1. The 2010 Curriculum and Student Portfolios. In this project, students in N101 and N102 will create personal websites where they can demonstrate their newly developed skills in ways that introduce themselves to the MAS community. The emphasis will be on (1) demonstrating skill in their discipline (PUL 4), and (2) evaluating alternatives for how they use the website to communicate about themselves (PUL 2).

2. Capstone Websites. In phase 2 of this project, we will formalize the assessment of the communication skills demonstrated in the capstone websites. We will also (1) establish a series of deadlines to insure that students give an appropriate amount of time to the communication aspect of their capstone experience, and (2) make the websites visible to other students and potential employers. Both of these changes are intended to reinforce the idea with MAS students that communicating effectively about their work is as important as being able to do the work.

Program Specific Assessments for the School of Informatics (SoI)

GRADUATE PROGRAMS

SoI – Human-Computer Interaction MAS Program					
	Degrees Awarded	**Certificates Awarded**	**Percent Employed**	**Average Salary**	**Ph.D. Acceptances**
2008-2009	**5**	**1**	**80%**	**NR**	**20%**
2009-2010	**6**	**1**	**86%**	**53,667**	**14%**
2010-2011					

Introduction

1. **Results of 2009-2010 assessment of learning outcomes assessment**
   Thus far no program assessment has been done since the inception of the HCI MS program began in 2003. One course, (HCI 1) was assessed in 2007, but this was to establish competencies and outcomes for the course. To do this a funded study was performed. The purpose of this study was to clarify to what degree the learning outcomes of the course HCI 1 (I541) aligned with three existing

measures of learning in HCI, including: Measure 1: Core Knowledge (*From two ACM SIGCHI Educational Groups*), Measure 2: Academic Competency (*IUPUI - PULs*), and Measure 3: Professional Best Practice (*Design Enterprise Model* - DEM). The results of this study can be found in the Appendices under the title: PRAC Study Results. What follows are three planned assessment projects for three of our core courses

2. **Three projects for the coming year 2010-2011**[1]
   We will be using the same model and similar questions for an assessment of all three courses outlined below. Each assessment project below will be assigned to three of the five core courses within the HCI MS program. With each project, I will provide the name of the course, the course description, and the learning outcomes; and finally, the specific question(s) we plan to ask. This is what Angelo and Cross refer to as the "Assessable Question".[2] The Assessable Question will ground our inquiry and allow us to directly answer the six PRAC questions below.

Assessment PROJECT ONE –

Review of the Course: <u>HCI 1 - I541</u>

Course Description: This course covers human-computer interaction theory and application from an integrated-approach of knowledge domains, i.e., the cognitive, behavioral, and social aspects of users and user context, relevant to the design and usability testing of interactive systems.[3]

Learning Outcomes: The course objectives of this course will include each graduate student acquiring the following related to:
1) Obtaining knowledge about HCI students will explain, recognize, and apply with considerable depth:

- Basic HCI theory, terms, principles, and conceptual models
- User-centered design theory and practices related to interaction design
- Product design and development processes and life-cycle
- User profiling to interaction design (needs and requirements)
- System requirements and product assessments
- Interface design principles and processes
- Prototype design basics: theory and practice
- Product usability evaluations and testing methods

[1] Note that to support our work of assessment, the HCI faculty are using the text Classroom Assessment Techniques: A Handbook for College Teachers, by T.A. Angelo and K.P. Cross. The text provides extensive examples and planning techniques for course and program assessment.
[2] A copy of the full syllabus will be in the appendices.
[3] It is important to note that HCI 1 is a foundation course, intended as a gateway into the HCI program. Therefore, it is a comprehensive overview of the theories, sub-disciplines, and best practice of the field.

2) Related to applying HCI theory and principles to product development, students will:

- Apply HCI principles and a user-centered approach to interaction design
- Analyze user needs and requirement
- Design and develop prototypes based on user assessments (needs and requirements), while applying HCI principles and models.
- Apply evaluation and usability testing methods to interactive products to validate design decisions

Assessable Questions:

The question will be based on the HCI 1 final project assignment. The title of the final assignment is: *Social Computing: A Design to Enhance Social Cueing.*[4] The goal of this final project is to design a socially translucent system that allows for the delivery of social-centered information by providing visual, verbal, or other interactive cues about the presence and activity of the participants. An example would be the system's ability to convey attentiveness, emotional conditions, peer pressure, or other forms of communication that are often times implicit, as well as ambiguous, but very real. These psychological conditions are not easily conveyed in the virtual world of computer-mediated communication. However, through the use of a well-designed conceptual and interaction design model and user interface, students will design and develop a social-centered system that matches the above criteria. Once the system is built, students will evaluate it with specific usability tools. The system students design should be able to be deployed on a mobile platform. The product will have a specific application and purpose, and will be used in a particular context. This context can be one or a combination of the following: Distance learning / education, Online forums and chat rooms, Standard communication for work and life, MMORPGs and other experimental 3D gaming spaces, and Acquiring, using, and manipulating any type of information, e.g., databases, news reports, etc.

The general assessment question is:

Does the final (project) product exhibit "acceptable" knowledge obtained about these four subject areas: (1) interface and interaction design theory and application, (2) user profiling and the contextual use of the product, (3) prototyping design techniques, and (4) basic (simplified) usability methods for analyzing user response? The four subject areas noted above are drawn from the list of learning outcomes for the course. The word "acceptable" here will be assigned a rubric from which to measure what is acceptable or an adequate level of manifested knowledge and skills once the final project is completed. This manifestation will be exhibited through the final product and an outline/report used to discuss the purpose and use of the system designed.

PRAC Questions:

a. **What general outcome are you seeking?**
   Students must achieve an acceptable level of knowledge and skills related to the four subject areas notes above as exhibited in their final course project, i.e., a social computing product.

[4] The details of the final assignment came be found in the appendices.

b. **How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)** Outcomes will include the knowledge and skills obtained as demonstrated through the application of the four subject areas. Hence, the following outcomes must be visibly shown in the final project, respective of these four areas:
    i. **Interface and interaction design theory and application –** Interface design and interaction design of system must reflect an understanding of the theoretical principles learned; including the application of this knowledge relative to the assignment which focuses on social computing innovation. Principles and practices of user interaction relative to interface functionality must be demonstrated relative to an adequate understanding of cognitive systems and user action upon the system.
    ii. **User profiling and the contextual use of the product -** Usability and "enjoyability" of the interactive system must reflect a considerable understanding of the user target audience and in particular the context and purpose of use.
    iii. **Prototyping design techniques -** Final execution of product must reflect knowledge of basic prototyping skills and an ability to synthesize basic interface design and user profiling information into a unified interactive system.
    iv. **Basic (simplified) usability methods for analyzing user response -** Must demonstrate an understanding of basic empirical methods of collecting qualitative data to assess the usability of the system designed, including data analysis of findings.
    v. **Overall learning -** The general system design must demonstrate that the students have a reasonable grasp on a solution to the design problem space identified, with the outcome being an innovative product that enables collaborative work in a social computing context that includes social interaction, social communication, and social exchange. The system designed must also reflect an understanding of (1) cognitive processes (including attention, memory, perception and learning), and (2) how users perceive, learn and remember how to execute the system tasks.

c. **What opportunities do students have to learn it? (in class or out of class)**
Students have weekly readings from the course text and research papers. During class there is an open review and discussion of content read; with an online quiz to further substantiate that students have acquire the facts of the reading. Class discussions are more for a deeper conceptual review of theories and interaction between students to discuss and debate several topics presented in the reading. Fifty percent of class time is also allotted for the applied portion of the course. Students work in teams on this final project; where they get a chance to apply what is read in the course text. Great efforts are made to parallel text content with the applied side to the project. Teams use class time to discuss weekly progress in the project. The instructor has the chance to meet weekly during class time with each team to briefly assess team progress and mentor them through any difficulties they are having in that particular stage of the project. Mentoring also includes helping student make connections between theories presented in class and their applied best practice in the project assignment.

d. **How are you measuring each of the desired behaviors listed in (b.)?**
The basic four outcomes listed in (b.) above are measured in three ways. During the final day of class, each student team is given the opportunity to present their interactive product to the class through a formal presentation. They must review their project progress through several stages of development, starting with identifying a problem space, through the development stages and concluding with their usability findings. They must explain their solution to the course final project problem on social computing. They conclude with a demonstration of the dynamic prototype they created. Traditionally, outside local system developers and usability professionals

are invited to class to hear the presentations. At the conclusion of the student presentation, both fellow classmates and the visiting professionals are allowed to ask questions about the products. Finally, formal assessments of the success of the project and knowledge of obtained is measured in three ways: (1) Fellow students evaluate using a formal evaluation form, (2) visiting professional evaluate using a formal evaluation form, and (3) the instructor evaluates using a formal evaluation form. The instructor's assessment also takes into consideration the assessment of the other two groups, weighing more heavily on the professionals input. See the Appendices for the valuation form used.

e. **What are the assessment findings?**
   Assessment findings will be based on rubric tools for evaluating student final project noted above.
f. **What improvements have been made based on assessment findings?** N/A

Assessment PROJECT 2 – Assessment of HCI 2 - I561

Assessment PROJECT 3 – Psychology of HCI - I563

SoI – Health Informatics MS Program					
	Degrees Awarded	**Certificates Awarded**	**Percent Employed**	**Average Salary**	**Ph.D. Acceptances**
2008-2009	**10**	**0**	**86%**	**39 – 45K**	
2009-2010	**9**	**0**	**83%**	**70,000**	
2010-2011					

Assessment PROJECT 1 – The Health Informatics assessment focuses on the course, Clinical Information Systems INFO I535

Course Description:
This course provides an introduction to clinical information systems. Clinical information systems include: human computer interface and systems design; healthcare decision support and clinical guidelines; system selection; organizational issues in system integration; project management for information technology change; system evaluation; regulatory policies; impact of the Internet; economic impacts of e-health; distributed healthcare information technologies and future trends.

Learning Outcomes:
1. Analyze the state of the science and current research issues related to (1) informatics applications for delivering and managing healthcare information in distributed environments and (2) clinical decision support/clinical guidelines.

2. Characterize health knowledge representation in system design, and human computer interface issues (hardware, software, end user).
3. Assess organizational challenges in the selection, integration and implementation of clinical information systems and develop strategies to meet these challenges.
4. Apply evaluation methodologies to support design, development and implementation of clinical information systems.
5. Analyze the issues related to security of information in clinical information systems in light of current standards, Federal regulatory requirements, and related organizational policies.
6. Analyze the impact of information technology on delivery of clinical information and work redesign in the clinical enterprise.

PRAC Questions:

a. What general outcome are you seeking?

The general outcome of this course is to create the student's ability to participate in a clinical information systems project development, implementation and evaluation.

b. How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)

- Perform workflow analysis and implement in system design and human computer interface issues (hardware, software, end user).
- Develop strategies to meet organizational and cultural demands when selecting, integrating and implementing clinical information systems
- Propose evaluation methodologies to support design, development and implementation of clinical information systems at different points in time
- Recognize issues related to security of information in clinical information systems in light of current standards, federal regulatory requirements, and related organizational policies.
- Analyze the impact of information technology on delivery of clinical information and work redesign in the clinical enterprise.

c. What opportunities do students have to learn it? (in class or out of class)

i. Threaded discussions (online) with peer and experts in field
ii. Virtual lab sessions
iii. Online e-service learning projects. The projects are real life clinical information system analysis, development, implementation, or evaluation projects in order to maximize the learning opportunities. Several prominent national and state health care institutions or enterprises are offering projects for this purpose.

d. How are you measuring each of the desired behaviors listed in (b.)?

- Knowledge assessment.
- Application assessment.

iv. The outcomes are measured based on the project management and execution of the online e-service projects: (1)Students self-evaluate their learning process, (2)faculty and project mentors evaluate project outcomes as defined in the project objectives

v. Student propose evaluation metric for electronic health record evaluation

e. **Basic experience for job search**
What are the assessment findings?
- Course content needs continued revision to reflect the transformational requirements in the quality, safety, outcomes, and thus in the value, of health services
- Projects need to combine formal clinical or health training with training in health IT
- Course's goal attainment is based on successful health IT deployment of students.

f. What improvements have been made based on assessment findings? N/A

Assessment PROJECT 2 – to be determined
Assessment PROJECT 3 – to be determined

SoI - Bioinformatics MS Program					
	Degrees Awarded	**Certificates Awarded**	**Percent Employed**	**Average Salary**	**Ph.D. Acceptances**
2008-2009	**5**	**0**	**100%**	**35000**	
2009-2010	**5**	**0**	**70%**		**20%**
2010-2011					

Assessment PROJECT 1 – The Bio Informatics assessment focuses on the course, **Biological Database Management** - INFO I556

Course Description:
Biological databases are becoming an essential component in biomedical studies, both for the annotation of newly produced data and in the support of the execution of analytical and statistical tools. In this course how to design databases will be described by using several data models including E-R data model, UML and the relational model. In particular, we will focus on the challenges unique for biological data such as its complexity, diversity and distribution. Data integration issues such as data quality and consistency will be addressed and existing data integration solutions will be described. We will further review a variety of biological databases such as SwissProt, GenBank and KEGG databases and study the characteristics of their data, as well as their access/retrieval techniques. In addition, the course will provide students with hands on experience in building biological databases through implementation of a database and making it available on the Web.

Learning Outcomes:

1. Acquire a good understanding of the features of biological databases, such as distribution, heterogeneity; and the challenges these

characteristics pose when creating, accessing or manipulating biological data.
2. Study the main biological data types (e.g. sequence data) that encompass the data types of biological databases as well as their features.
3. Study representatives of popular biological databases, in terms of the data they provide access to, their access mode, the data format, the architecture of underlying databases if available, and comparison with related biological databases.
4. Study research papers addressing some of the challenges that biological data create in areas such as data integration, data provenance; and analyze the advantages and limitations of the proposed solutions.
5. Study different data models deployed in the design of a database such as entity relationship model, UML model, and their adaptation for biological data.
6. Learn the different steps involved in designing a biological database and making it available through a web-based interface.
7. Acquire some hand-on experience by creating a web-based biological database application that addresses specific needs of researchers in bioinformatics. Students will practice within a team setting all the design and implementation steps involved in building a web-based biological database starting from requirement analysis, then moving to design phase and finishing with creation of the database and the web-based interface.
8. Gain experience in presenting research work through class presentations and research paper preparation following standard publishing format such as IEEE publishing format.

PRAC Questions:

a. What general outcome are you seeking?

The general outcome of this course is to enable students to design, implement, and maintain a biological database application

b. How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)

- Perform background analysis including study of related databases and their features and limitations as well as summarize related research work.
- Identify the different types of data provided by the database, data sources, access mode, the IT level of end users as well as their immediate and potential future needs from the database.
- Perform a step-by-step database design including conceptual design, logical design and refine through normalization while still integrating users and data specifics.
- Include a testing phase of the product to integrate user feedback before presentation of final product
- Provide prepared tutorials to help end users better utilize the end product
- Describe the limitations of the end product such as features and security supported, as well as technology and maintenance requirements.

c. What opportunities do students have to learn it? (in class or out of class)

- In class problem solving involving instructor and students
- Hand-on experience with data modeling and data representation software as well as database management systems

- Access to recent research papers addressing various types of challenges of biological data
- Team environment working in describing existing popular biological databases, recent research work and developing biological database applications

d. How are you measuring each of the desired behaviors listed in (b.)?

- Knowledge assessment.
- Application assessment.
- Quality and depth of research paper and biological databases investigation and presentation
- The development of the database application is assessed through three stages starting from the project proposal, mid-term project progress, and final delivery including paper, presentation and demo.

e. What are the assessment findings?

- Course content needs continued revision to reflect the ever evolving nature of biological data and databases as well as take into account the new challenges created by evolving users needs
- Projects ideas need to include more researchers' needs in biomedical fields from local institutions such as school of medicine, and department of biology.
- Course's goal attainment is based on successful deployment of students in bioinformatics field.

f. What improvements have been made based on assessment findings? N/A

Assessment PROJECT 2 – to be determined
Assessment PROJECT 3 – to be determined

SoI - Media Arts and Science MS Program					
	Degrees Awarded	**Certificates Awarded**	**Percent Employed**	**Average Salary**	**Ph.D. Acceptances**
2008-2009	**9**	**0**	**75%**	**29,000**	**13%**
2009-2010	**4**	**0**	**60%**		
2010-2011					

Assessment PROJECT 1 - The proposed assessment project is for a course in Media Arts and Science called: Principles of Multimedia Technology (N500).

Course Description: This course examines issues related to digital media communication in the context of e-commerce and the information industry especially its impact on the cultural, economic, social, and ethical dimensions of local markets and global communities. Within the area of multimedia technology, this course provides a rigorous in depth look into theories surrounding media arts and science, problem solving and identifiable issues in multimedia applications during design and development. Topics also include: usability, intellectual property and a diversity of users for new media products.

Learning Outcomes: Students should be able to discuss terms and summations about the principles of multimedia technology as well demonstrate achievement in the following broad range of new media topics:

Learning Outcome – Group 1

- Analyze and discuss the most current and interesting issues in multimedia technology
- Analyze and present evaluative feedback on several case studies
- Define issues relating to intellectual property, copyright, and trademark and explain how they
- impact multimedia technology

Learning Outcome – Group 2

- Demonstrate the ability to work with elements (text, graphics, sound, and video) on a media project or web site design
- Demonstrate the ability to work in a team environment to produce and deliver an instructional sequence for classmates on a topic in media arts and science.
- Demonstrate efficient time and production management using project development

Learning Outcome – Group 3

- Demonstrate critical thinking and effective writing skills reporting on case studies in the field of media arts and science
- Demonstrate effective presentation and delivery skills using an instructional design sequence using a media arts and science application

PRAC Questions:

a. **What general outcome are you seeking?**
   The general outcome(s) I am seeking from students in N500 are:
   An understanding of current multimedia technologies which include advancements in hardware and software;
   A demonstration of multimedia design and production skills;
   A demonstration of critical thinking using effective writing skills;
   A demonstration of collaborative learning, professional delivery and presentation
b. **How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)**
   Learning outcomes can be substantiated from the level of discussion, design and production applications, written critiques and formal presentations.

c. **What opportunities do students have to learn it? (in class or out of class)**
Students have opportunities both in and out of class to learn the objectives set forth in the syllabus. Links to specific journal articles and pertinent websites are provided in Oncourse. Students are given lab time to meet in groups to discuss, design and develop productions. Students are expected to make sufficient progress on each assignment by meeting in groups outside of class.

d. **How are you measuring each of the desired behaviors listed in (b.)?**
Students are graded on:
Discussions surrounding various topics and issues in multimedia technology;
The design and development of a multimedia application (project);
Written critiques on assigned case studies;
Team-based collaborative learning and formal presentations

e. **What are the assessment findings?**
Assessment findings are substantiated in the average grade achieved by students in this course. Currently, the average grade is 'A.' The quality of student work in this course is mostly exemplary. Most students use this course as a means to identify and begin work on their Master's Thesis or Project in this program.

f. **What improvements have been made based on assessment findings? N/A**

Assessment PROJECT 2 – to be determined
Assessment PROJECT 3 – to be determined

Informatics - Ph.D. Program				
	Degrees Awarded	**Certificates Awarded**	**Percent Employed**	**Average Salary**
2008-2009	**0**	**0**		
2009-2010	**1**	**0**		
2010-2011				

Assessment PROJECT 1 – *Assessment* of- I575 – Informatics Research Design

As the graduate programs in Informatics are fairly new, we have selected this course (required of all Ph.D. and M.S. students in the school) to assess over the coming year.

Course Description: This course covers a full spectrum of research concepts, designs, and methodologies used in informatics research, from quantitative to qualitative research; from deterministic, hypothesis-driven experimental designs to a-posteriori

discovery through data mining. Philosophical foundations to practical applications are also discussed. This course provides the conceptual framework in which informatics graduate students may develop their own research agenda.

Learning Outcomes:

1. Providing a conceptual framework for research by introducing the basic concepts of research that apply to all disciplines;
2. Imparting a sense of the culture of research by presenting the purposes and principles of research generally valued by all investigators;
3. Fostering appreciation for the diversity of research by comparing the assumptions and intentions of different research paradigms;
4. Promoting confidence in conducting research by relating general principles to practical examples;
5. Engendering a critical perception of research by rigorously evaluating published studies;
6. Providing an understanding of statistics required to conduct quantitative data analysis;
7. Basic knowledge of SPSS software for statistical analysis;
8. Developing a more practical understanding of statistics by approaching statistical methods in the context of specific applications;
9. Introducing tools for qualitative data analysis.

PRAC Questions:

a. What general outcome are you seeking?

The overall goal of this course is to help prepare informatics graduate students to conceptualize, plan, and articulate their research goals. In the short term, this is to help them develop the skills necessary for their thesis or dissertation proposals, while the long term goal is to prepare them for careers as successful researchers.

b. How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)

Students will be able to identify and clearly articulate problems worthy of study in their field's literature, identify and justify appropriate methods for pursuing those problems, and compose a convincing research proposal in a form suitable for submission to major granting agencies (NSF, NIH, etc.)

c. What opportunities do students have to learn it? (In class or out of class).

Students are provided with weekly readings covering a variety of topics in quantitative and qualitative research methodologies. Each week there is a quiz on these readings. Much of the in-class time is dedicated to further exploring and discussing the issues raised by these readings, as well as relevant examples and exercises based on real research projects. Outside of class, students are tasked with ongoing assignments to explore the literature related to their topics of interest, a portion of which is submitted

as a formally-prepared bibliography. Several homework assignments using the statistics software provide an opportunity for students to understand the reciprocal relationship between research design and data analysis.

d. How are you measuring each of the desired behaviors listed in (b.)?

Four main assignments frame the desired outcomes of this course. The first is a brief written summary of their proposed research topic. Next, based on feedback from the first assignment and the concepts covered in the first several weeks of readings, students give an in-class presentation on the first draft of their research proposal, receiving feedback from the instructor and other students in the class. Third, this work culminates in a formal research proposal that demonstrates effective use of the concepts covered so far in class. Finally, a peer-review process assigns several proposals for each student to critique. This provides them with the opportunity to apply these skills from the perspective of an external reviewer, complementing their skills as a proposal author.

e. What are the assessment findings?

Students exit the class prepared to write a high-quality proposal for their thesis or dissertation. The skills to achieve this are tightly coupled to many core aspects of scholarship: academic writing, reviewing extant literature, and operational familiarity with a diverse range of quantitative and qualitative research methodologies. An excellent student will leave this course with a strong draft of his or her thesis or dissertation proposal completed, having used the opportunity of the course assignments to rigorously push forward on their own individual research. Such a student would also be prepared for a level of academic writing suitable for peer-reviewed conferences and journals. A good student will leave this course with a well-developed research proposal, having learned many lessons via feedback from the instructor and students in the review process. Such a student would continue to work with his or her advisor to further develop and refine the thesis or dissertation plans.

A fair student will have completed the assignments in the course satisfactorily, indicating a grasp of the basic competencies of academic writing and research methodology. Such a student would most likely begin the process anew with his or her actual thesis or dissertation proposal. A poor student will struggle with academic writing, have difficulty identifying suitable methodologies for a given research problem, and will be poorly prepared for reviewing relevant literature. However, the phased design of the course, with frequent opportunities for feedback and review, makes it difficult for a student to not achieve at least the basic competencies of the course.

f. What improvements have been made based on assessment findings? N/A

Assessment PROJECT 2 – to be determined
Assessment PROJECT 3 – to be determined