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2002-2003 Learning and Assessment Report
School of Informatics
June 2003

Informatics is the study of scientific, technical, aesthetic, and organizational aspects of computerization, especially how relevant *data* are managed and informed *decisions* are made, usually with reference to a specific applied discipline (for example, Chemical Informatics or Media Informatics).[i] **Informatics™** is a catalyst for discovery of new principles to *inform* our understanding of the world, for development of new approaches that *transform* our abilities in the world, and for delivery of needed progress to *perform* among the best in the world.[ii]

I. Introduction

The Indiana University School of Informatics (SOI), established in 2000, educates students in the fundamental knowledge of applied information concepts and related information technology contexts.[iii] SOI faculty and staff [iv] are fully committed to this principal goal, as demonstrated within the established program[v] that offers plans of study for an Associate degree, two baccalaureate degrees, two certificates, a minor, and five Master of Science degrees. Within a broadly based educational curricular format, each student can acquire the strategic concepts and tactical applications needed to achieve personal and professional growth in the dynamic and diverse domains of the School of Informatics, all in direct alignment with the ***IUPUI Mission*** and the ***IUPUI Statement of Values***[vi].

The Informatics (INFO), New Media (NEWM), and Health Information Administration (HIA) programs of the School of Informatics each provides a foundation for intellectual development and promotes an ability and desire to make contributions to society. Students become well-informed, effective citizens, actively participating in civic and community affairs; cultivating self-awareness; appreciating the humanities and pursuing life-long learning. As the state leads Manufacturing and lags Service sectors[vii] the school develops new programs and initiatives responding to societal needs, student demands, advances in research and knowledge as well as application. In this regard, the School leads learners by explicit example in the exploration and execution of the ***IUPUI Principles of Undergraduate [and Life Long] Learning***[viii] (PUL's, PUL³'s).

Graduates of the School of Informatics Programs face the complex and changing needs of the Information industry[ix] and the state job market[x] where "all of the net job creation now comes from small and medium firms"[xi] and the "bulk of U.S. economic gains are coming from advances in technology, productivity and worker skills and knowledge."[xii] This drives the dynamic direction of the School's learning objectives and programs , continuously raising the baseline[xiii] for achieving that growth in a context of persistent, pervasive change.[xiv]

The State of Indiana acknowledged SOI as Indiana University's highest priority for 2001-2003,[xv] the State Legislature specified informatics as a "targeted employment" business activity,[xvi] and the Governor listed SOI among efforts toward adding High-Tech, High-Growth Jobs[xvii] [xviii] and noted:[xix]

> IU's new School of Informatics is training students for careers in what used to be the jobs of tomorrow – jobs that now are a critical and rapidly growing component of Indiana's economy today.

The 1998 Informatics Planning Committee gave the following motivation for the new school:[xx]

> The movement of society into the information age involves developments in information science and technology, distributed information processing, computer and cognitive science, social aspects of dealing with distributed information, knowledge retrieval, distributed teaching and learning, information dissemination, and many related themes. All academic and research programs at IU are (or shortly will be) affected by these developments. This task force recommends that a new school, tentatively titled "School of Informatics," be formed to promote teaching, training, and research in these areas, and thereby play a catalyzing role in this ongoing evolutionary process.

Constant for and central to SOI programs is integration of a "'traditional' academic discipline in the sciences, humanities, arts, or professions, with a deep exploration of the associated information science and

technology. [An undergraduate degree] will require either a senior thesis demonstrating depth in the information science aspects of a particular discipline, or a one-year development project working with a multi-disciplinary team to solve a real application problem."[xxi] Many "cognate" disciplines are available.[xxii]

The School's intrinsically interdisciplinary function at "the intersection of the human and the technical, of art and science"[xxiii] promotes a perspective of progress and innovation through rapid prototyping of programs and projects appropriate to address various challenges the citizenry is called to meet immediately, in the interim by 2005, and before the state bicentennial in 2016. As reported in early 1999:[xxiv]

- Since 1981, Indiana wages have lagged those of the nation.
- Only 16.8% of Indiana's jobs require a bachelor's degree or higher.
- Many of Indiana's good-paying jobs require training other than a four-year degree.
- 54% of Indiana jobs are in occupations that have a median wage below $10/hour, or $20,000/year.
- For every 100 high skill job openings, only 65 job applicants had the mix of skills required.

Fundamental to student, school, university and state success from SOI programs will be a continuing accommodation to constant change as uniquely valuable niche concepts are adopted and adapted to commodity contexts. Continuously redefining, if not outright reinventing, and clearly articulating the distinguishing aspects which synergistically promote competitive advantage – for the students, the school, the university, and the state – is critical. For example, the context of a course offering falls into a multi-dimensional "synergy function" with respect to other courses, schools, universities, community colleges,[xxv] technical programs,[xxvi] and commercial sources of professional preparation. Although this is complicated and can produce significant interim confusion among colleagues and collaborators, it is important never to lose sight of what distinguishes one option from another in the ultimate consumer's frame of reference.

The School of Informatics will be foremost in the country to graduate professionals with formal preparation in Information Technology with subject area expertise.[xxvii] That mission includes the following.

- Encourage interdisciplinary research projects in the field of Informatics, focusing on distributed systems technology, information theory and information management, human factors and Human Computer Interaction, and study of the social impacts of information technology
- Serve the state of Indiana by way of education, community participation and collaborative research partnerships, thereby participating in the growth of an IT culture in the State, and encouraging continued economic development
- Produce graduates who become leaders in the growing information economy of Indiana and the world.
- Develop synergistic relationships with industry to develop and advance research in Information Technology and its applications.

II. Student Learning Objectives

Each successful student will acquire the strategic concepts and tactical applications needed to achieve personal and professional growth in general, among the dynamic and diverse domains of the School of Informatics; and specifically within the focus area chosen by the student and approved by the School.

Demonstration and evaluation of student success may be accomplished based upon

A. general framework of the ***IUPUI Principles of Undergraduate [and Life Long] Learning***, with
B. interpretations and extensions for a **course syllabus, specialization**, or **degree plan of study**, and
C. either a senior **thesis** demonstrating depth in the information science aspects of a particular discipline, or a one-year development **project** working with a multi-disciplinary team

together with

D. general common operational criteria such as the ***European Computer Drivers License***,
E. general professional criteria for the **"cognate"** academic discipline, and
F. specific professional criteria for the major, such as the ***IS 2002 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems*** [Informatics].

Long-term success extends to application of learning in high-tech, high-growth jobs in the Information industry of the Services sector expansion in the Indiana economy.

A) Based upon IUPUI Principles of Undergraduate [and Life Long] Learning

The Student Learning Objectives based upon the IUPUI Principles of Undergraduate [and Life Long] Learning present in the 2001-2002 report have been moved to a reference section of this report because they represent a continuing list of expectations for which it remains a challenge to find an efficient means to measure the effects.

Matching this, at the university level, are the on-going efforts of the IUPUI Program Review and Assessment Committee (PRAC) to articulate these Principles in a frame of reference that students can value and faculty can evaluate.[xxviii]

B) Based upon Course Syllabus, Specialization, or Degree Plan of Study

Professional outcomes may be further extended within a specific degree program or area of specialization.

1) Courses (Also) Serving Non-SOI-Majors

a) Certificate in Internet Application Development (NEWM), 24+3cr.[xxix]
b) Undergraduate Certificate in Informatics (INFO), 26+3 cr.[xxx]
c) Undergraduate Minor in Informatics (INFO)[xxxi]

Currently, there are no additional student learning outcomes from the service courses, nor for the various Certificates, nor for the Minor in Informatics. The IUPUI Principles may be applied predominantly at the Introductory level, due to the decreased contact with upper-level curriculum contexts.

2) The A.S. Degree

A.S. Media Arts and Technology (NEWM)

Although "New Media" is a dynamic and constantly emerging professional field, the degree is based in the traditional arts and sciences. Focused on applied research and application, the associate degree is oriented toward professional practice and relies on a theory base drawn from fundamental disciplines that study communication as sight, sound and motion.[xxxii]

Currently, there are no specific student learning outcomes for professional practice in the Associate degree plan of study. The IUPUI Principles may be applied predominantly at the Introductory level, due to decreased contact with upper-level curriculum contexts.

3) The B.S. Degrees

The additional elaboration on student-learning outcomes from the baccalaureate degree plans of study includes skills and knowledge listed below. The IUPUI Principles may be applied with full rigor.

a) B.S. Health Information Administration

The Bachelor of Science in Health Information Administration is a professional program with a long history at IUPUI, yet it is a recent addition to the School of Informatics at IUPUI. The professional component is offered in the junior and senior years of the program, which is accredited by the Commission on Accreditation of Allied Health Education Programs. Currently, this professional degree plan of study is out of scope for this report.

b) B.S. Informatics

The Bachelor of Science in Informatics degree develops skills and knowledge in information concepts and related information technology contexts with the purpose of preparing students to design, develop, and deploy processes involving computerization for acquiring and managing relevant data in making informed

decisions. Focused on applied research and application, the degree is oriented toward professional practice and relies on a theory base drawn from fundamental disciplines which have application to informatics

Skills and knowledge embedded in this degree program include: technical understanding of how computing systems operate, ability to adapt/assess and apply new trends in IT, well-developed problem-solving skills, ability to work in teams such as those formed for the senior capstone project, well-developed communications skills to clearly convey solutions and observations to others, and understanding of social and ethical principles as they relate to IT issues. These valuable skills can be transported to a number of job settings.

The IUPUI Principles remain to be developed at the Advanced levels in this program of study; in the interim, and as a guide, professional criteria in subsequent sub-sections may serve well.

c) B.S. Media Arts and Science

The Bachelor of Science in Media Arts and Science degree develops skills and knowledge in new media with the purpose of preparing students to manage and coordinate Internet and web operations and multimedia production and development. Focused on applied research and application, the degree is oriented toward professional practice and relies on a theory base drawn from fundamental disciplines that study communication as sight, sound and motion.

Skills and knowledge embedded in this degree program include: web page and multimedia design coordination, web-based computer programming, multimedia authoring language skills, multimedia implementation of audio and video materials, digital graphics (photography, scanning), and the writing and editing of materials for multimedia story boarding and content. Students will be able to develop a web site from scratch with full knowledge of all elements required for development, operational support and security; develop programs in languages on multiple computer platforms; prepare and present a major project with full industry-standard documentation; plan projects; allocate and budget resources; and practice with an understanding of ethical, legal and regulatory considerations. [xxxiii]

Previously, four Areas of Specialization were recognized: New Media Core (NMC), Interactive Media and Usability (IMU), Spatial Media and Gaming (SMG), and New Media Management (NMM). Currently, the New Media curriculum is in the process of revision in terms of Core and Flexible Core blocks followed by one of four tracks: Multimedia Communication, Digital Storytelling, Video Production and Sound Design, and Applications Design.

The IUPUI Principles remain to be developed at the Advanced levels in this program of study; in the interim, and as a guide, professional criteria in subsequent sub-sections may serve well.

4) The M.S. Degrees

Currently, the masters degree plans of study are out of scope for this report. Regardless, the IUPUI Principles may be applied with full rigor.

a) M.S. in Bioinformatics
b) M.S. in Chemical Informatics
c) M.S. in Health Informatics
d) M.S. in Human-Computer Interaction
and
e) M.S. in Media Arts and Science

C) Based upon Senior Thesis or Interdisciplinary Project

SOI professional core competencies extend from the Principles of Undergraduate and Life Long Learning, permeate degree plans of study and culminate in capstone coursework products and professional portfolios.

- relevant information acquisition & analysis for informed decision/algorithm design & development
- consensus, group and individual accountability and professionalism
- implementation acceleration and organizational change management

All students are encouraged to engage in independent study and/or research with a faculty mentor.

All candidates for the Bachelor of Science degree must complete a capstone experience project or thesis that is juried by the faculty. Many students take advantage of the internships or cooperatives in order to receive "real world" experience.

D) Based upon Common Operational Criteria

Students who are provisionally admitted to a program are permitted to enroll in boot camp remediation courses that are offered outside the academic schedule. The school has authorized some students to contract with other IUPUI academic or administrative units and/or external organizations to complete work related to information technology, graphic design, programming, animation and video/audio editing.

It is expected that students will have the required prerequisite proficiency and literacy with information resources and information technology. Most SOI courses have prerequisites that are set to maximize the efficiency of the course and the effectiveness of the students who are prepared and who participate. Regardless of student age, experience, etc., it is not appropriate for prerequisites to be ignored.

For example, deficiencies in computer literacy may be addressed by a spectrum of options, some of which explicitly reference common operational criteria such as the European Computer Drivers Licence.

- UITS on-line training (NETg) or training class
- IUPUI service courses such as BUS K201, CPT 106, CSCI N100, etc.
- Ivy Tech programs in Computer and Information Science, Visual Comm'n., and/or Video Prod'n.
- ITT Technical Institute programs in Information Technology.

Thus, it is an expected ("negative") Student Learning Outcome that no remedial load was placed on a course or on other students' learning by virtue of clear lack of prerequisite preparation by any student.

E) Based upon General Professional Criteria for the Cognate

Students Learning Outcomes are expected to include professional criteria for the Cognate. Currently, this is handled informally between advisors with the capstone review process.

F) Based upon Specific Professional Criteria for the Major

Students Learning Outcomes are expected to include professional criteria for the Major. Currently, this is handled informally between advisors with the capstone review process.

Although treated a separate in this report, it is likely that this item will be integrated into sub-section C) Based Upon Course Syllabus, Specialization, and/or Degree Plan of Study. Furthermore, that will have a direct impact on specification of the IUPUI Principles at the Advanced levels within a specific program.

This overlap – among professional expectations, a degree plan of study, and the IUPUI Principles at the Advanced levels – is shown by the reflection of the latter two in this excerpt.[xxxiv]

> In conceptualizing the role of information systems in the future and the requirements for IS [Informatics] curricula, several elements remain important and characteristic of the discipline. These characteristics evolve around four major areas of the IS [Informatics] profession and therefore must be integrated into any IS curriculum:
>
> 1. IS professionals must have a broad business and real world perspective. Students must therefore understand that:
> • IS are enablers of successful performance in organizations
> • IS span and integrate all organizational levels and business functions
> • IS are increasingly of strategic significance because of the scope of the organizational systems involved and the role systems play in enabling organizational strategy

2. IS professionals must have strong analytical and critical thinking skills. Students must therefore:
• Be problem solvers and critical thinkers
• Use systems concepts for understanding and framing problems
• Be capable of applying both traditional and new concepts and skills
• Understand that a system consists of people, procedures, hardware, software, and data

3. IS professionals must exhibit strong ethical principles and have good interpersonal communication and team skills. Students must understand that:
• IS require the application of professional codes of conduct
• IS require collaboration as well as successful individual effort
• IS design and management demand excellent communication skills (oral, written, and listening)
• IS require persistence, curiosity, creativity, risk taking, and a tolerance of these abilities in others

4. IS professionals must design and implement information technology solutions that enhance organizational performance. Students must therefore:
• Possess skills in understanding and modeling organizational processes and data, defining and implementing technical and process solutions, managing projects, and integrating systems
• Be fluent in techniques for acquiring, converting, transmitting, and storing data and information
• Focus on the application of information technology in helping individuals, groups, and organizations achieve their goals

Such professional criteria also are valuable guides to evaluating activities outside the major.

Student Groups	**Curriculum Model**
All Students	IS 2002.P0 Personal Productivity with IS Technology IS 2002.1 Fundamentals of Information Systems
IS Majors and Minors	IS 2002.2 Electronic Business Strategy, Architecture and Design IS 2002.4 Information Technology Hardware and Software IS 2002.5 Programming, Data, File and Object Structures IS 2002.7 Analysis and Logical Design
IS Majors	IS 2002.3 Information Systems Theory and Practice IS 2002.6 Networks and Telecommunication IS 2002.8 Physical Design and Implementation with a DBMS IS 2002.9 Physical Design and Implementation in Emerging Environments IS 2002.10 Project Management and Practice

Figure 4. Representative IS 2002 Curriculum Design for All Students, IS Minors, and IS Majors

IS 2002.1 – Fundamentals of Information Systems (Prerequisite: IS 2002.P0)

Learning Unit Number	Learning Unit Goal
5	to introduce systems and quality concepts
6	to provide an introduction to the organizational uses of information to improve overall quality
7	to present hardware, software, and related information technology concepts
8	to provide concepts and skills for the specification and design or the re-engineering of organizationally related systems of limited scope using information technology
9	to show how information technology can be used to design, facilitate, and communicate organizational goals and objectives
10	to explain the concepts of individual decision making, goal setting, trustworthiness, and empowerment
11	to show career paths in Information Systems
12	to present and discuss the professional and ethical responsibilities of the IS practitioner

From APPENDIX 6 — IS 2002 COURSE LEARNING UNIT GOALS

III. Assessment Activities

Compared to the Informatics Program, the New Media Program is the older, larger, and (perhaps arguably) the more diverse and numerous in terms of its targeted domains. As a "virtual school" the SOI utilizes faculty and courses from existing departments in the SOI plans of study, especially for the Informatics Program. Currently, both programs assess courses across the board, although this is very much a work in progress.

A) New Assessment Activities

The SOI faculty committee on Assessment chairperson and other SOI faculty members participated in the revision and clarification process for the IUPUI Principles, especially #1e and #3 among others.

The IUPUI Principles were engaged explicitly in three target student groups by the committee chairperson who happened to have course responsibilities for capstone seniors, introductory undergraduates, and introductory graduates. It was extremely difficult to use the IUPUI Principles in a meaningful way. Part of the complication may be addressed by the current PRAC efforts to clarify applications of the IUPUI Principles.

> 3. To use information and concepts from studies in multiple disciplines in their intellectual, professional, and community lives. Students can apply knowledge to:
> - enhance their personal lives;
> - meet professional standards and competencies, and;
> - further the goals of society.

For example, many students found PUL #3 to be not creative or internally fulfilling at all and instead found it to be constraining and externally focused. Upon closer examination, it seems that the difference of perspective is driven in large part by the language used to express the concepts and also by the context in which they are placed by the students. In particular, the students may not "see themselves" in the "society" of PUL #3, and they may not see how this will "enhance their personal lives" if they are already tactically satisfied or otherwise preoccupied with things outside of being a student.

In addition, professional criteria and model curricula were reviewed in an on-going effort to position SOI programs optimally in advance of changes in the professions and related industries. Some of this is reflected in this report. It is important to have a professional framework that can permit communication and even certification of capabilities acquired in a degree program plan of study, especially for new, intrinsically interdisciplinary and dynamic fields like those in the School of Informatics. In addition to a professional framework for evaluation, it is critical to understand the professional foundation for entry into a degree program plan of study, and to recognize that the constant "raising the bar" for mere foundation (commodity) capabilities may cause particular problems in an urban university where student experience may be out of sync with constant change and expected growth experienced by traditional students.

For example, the ***IS 2002*** model curriculum was updated from the ***IS 1997*** version due to dramatic increases in "the basic computer literacy of incoming university students."[xxxv] And, as mentioned earlier, the current foundation represented by the ***ECDL*** syllabus version 4 are directly addressed by rudimentary on-line training capabilities such as NETg and may be more appropriate to Community College curricula.

B) Continuing Assessment Activities

The SOI faculty committee on Assessment was formed in August 2001. The founding chairperson became a regular participant in the University Program Review and Assessment Committee (PRAC) and continued in that capacity during the 2002-2003 school year. Formulation of additional formal assessment provisions continues to be an active agenda item.

1) Courses (Also) Serving Non-SOI-Majors

Currently, there is no formal assessment process for this category.

2) The A.S. Degree

Currently, there is no formal assessment process for this category.

3) The B.S. Degrees

The Health Information Administration Program is a professional program which recently moved to the School of Informatics, and it currently is out of scope for this report.

The New Media Program and the Informatics Program both are very new, and what data exists cannot show trends with statistical significance. The first IUPUI Informatics baccalaureate degree was granted only last year, in May 2002. Nonetheless, supplemental strategies include assessing the numbers of degrees conferred, and the rates of retention and graduation. In addition, surveys are used to assess how well students believe they have learned the course outcomes. No comprehensive exit interview is made.

Undergraduate Students[xxxvi]	'00-'01	'01-'02	Now
IUB	50	237	423
IUPUI	238	685	702
Total	**288**	**922**	**1,125**
Graduate Students	'00-'01	'01-'02	Now
IUB	0	22	55
IUPUI	116	153	143
Total	**116**	**175**	**198**

In May 2003, the baccalaureate graduating class (across both IUB and IUPUI) had the following demographics. 147 in class, 3.06 GPA, 33% women, 17% minorities, 6% international students, 78% Indiana residents.[xxxvii]

Both programs assume and expect that the vast majority of their graduates will seek employment or advancement in lieu of additional academic experience. Thus, employment or advancement success and employer satisfaction are supplemental strategies for assessment.

And, both programs target job roles that may involve professional organization affiliation yet do not require professional accreditation or regulatory certification (currently); therefore, both programs require a "capstone" portfolio and/or thesis review. This "practical" application of acquired knowledge and achieved skill is a major source of performance assessment data.

Students are required to take a pre-assessment skills examination during their NEWM gateway course N100 and N101. At that time, UCOL students receive pre-entry advising, as well as the opportunity to enroll in the informatics first-year experience classes. Students should be able to demonstrate competencies of performance as a measurable outcome by the use of written reports, projects, oral presentations, examinations and quizzes, laboratory reports, and portfolio preparation.

The grade for a course will be determined by the course instructor, using the objectives and criteria stated in the course syllabus. Typically, this will involve exercises and examinations which may be written or oral, plus reviews and projects which may be assigned to the student individually or within a group of students. The successful student will demonstrate understanding of strategic course concepts and their application in tactical contexts.

The senior capstone experience permits an assessment of the extent to which the student can exhibit a general education perspective while demonstrating proficiency in their major and concentration or specialization area.

4) The M.S. Degrees

Currently, there is no formal assessment process for this category, beyond traditional criteria of grade point and thesis or project committee evaluation.

C) Previous Assessment Activities

The school is too new to have much in the way of past assessment activities. However, there have been activities which may help precondition the school for assessment activities. For example, the faculty has developed collaborative efforts with other departments such as computer technology and computer science. The School has also developed cross-listed courses with computer science, chemistry, allied health, organizational leadership and supervision, and biology; thereby, maximizing resource effectiveness and minimizing resource redundancy.

IV. Feedback and Response

The school and its assessment engagement is too new to have much in the way of response. Nonetheless, it is fortunate, in this new School, that assessment of student learning has been introduced during the infancy of the New Media Program and the Informatics Program, and during the new era of Health Information Administration within the School of Informatics. As these vanguard programs continue to advance, it is increasingly critical that faculty remain actively engaged in the continuous improvement of student learning and student satisfaction with the learning process.

V. Future Assessment Plans

In the next school year, the SOI faculty committee on Assessment will seek to extend the coverage and consistency of assessment strategy and methods, especially to include the addition of the Health Information Administration program, as appropriate and practical for this professional program. The committee will continue to coordinate closely with the SOI leadership and with other SOI faculty committees, especially the faculty committee on Curriculum and the faculty committee on Technology. In addition, it will remain actively engaged on the IUPUI Planning Review & Assessment Committee[xxxviii] (PRAC) and with the many representatives to that committee from other schools from who much already has been learned. In doing so, the committee will leverage this year's learning, reflected in new curriculum courses and criteria, to formulate and seek acceptance for "improvement through the collection of evaluative data and reflection on the implications of the findings for practice"[xxxix].

VI. Concluding Remarks

"In 1997, colleges and universities in the state of Indiana granted 29,679 baccalaureate degrees. However, in 1998, the U.S. Census Bureau indicated that Indiana ranked 47th of all states in the number of residents over 25 years of age with a baccalaureate degree. This alarming differentiation has been called the 'brain drain.'"[xl]

The recent establishment of the Indiana University School of Informatics is one direct response to the "Indiana brain drain" issue. It is an intrinsically interdisciplinary response that seeks to address issues systemically, so that the whole is indeed greater than the sum of its parts. Assessment is a critical component of confidently charting the School's course past the complex challenges of these chaotic times.

VII. Notes on IUPUI Principles of Undergraduate and Life Long Learning

1) Core Communication and Quantitative Skills

To write, read, speak, and listen, perform quantitative analysis, and use information resources and technology and the foundation skills necessary for all IUPUI students to succeed. Students can:

a. express ideas and facts to others effectively in a variety of written formats;

form: *practical reports and reviews, essay assignments and examination questions*
objective: *improve efficiency of creating effective written (non-interactive) communication*
strategies: *case studies, personal statements, product/service review*
evaluation: *situation-specific effectiveness evaluation and holistic rubrics*
improvements: *recognition of ongoing need for improved written communication*

b. comprehend, interpret, and analyze texts;

form: *current awareness and other reading assignments, problem-solving classroom discussions*
objective: *determine characteristics, evaluate performance, understand abstract concepts and application contexts*
strategies: *read, determine statement of the problem, understand approaches to solution, select a solution, implement, review, revise, report*
evaluation: *report evaluation according to criteria*
improvements: *impact when "the whole is greater than the sum of the parts"*

c. communicate orally in one-on-one and group settings;

form: *oral presentation*
objective: *improve efficiency of creating effective oral communication*
strategies: *planned presentations and extemporaneous class discussions*
evaluation: *situation-specific effectiveness evaluation and holistioc rubrics*
improvements: *recognition of ongoing need for improved oral communication*

d. solve problems that are quantitative in nature, and

form: *modeling; problem-solving, project management, and related activities*
objective: *construct and use models of physical systems*
strategies: *balance quantitative and qualitative aspects of problem-solving*
evaluation: *model evaluation according to criteria*
improvements: *quantitative applications of relevant data*

e. make efficient use of information resources and technology for personal and professional needs.

form: *Electronic library, CD, and Internet-based information search and retrieval; computer-based presentations; integrated use of e-mail, OnCourse, etc.*
objective: *effective use of personal computer productivity applications*
strategies: *leverage existing technology aids, tutorials, assistance, and computer labs*
evaluation: *reports and presentation in course; student and alumni reports post-course*
improvements: *reduce remedial tangents in classes with "Prerequisite: computer literacy"*

2) Critical Thinking

To analyze information and ideas carefully and logically from multiple perspectives. Students can:

- ❑ analyze complex issues and make informed decisions;
- ❑ synthesize information in order to arrive at reasoned conclusions;
- ❑ evaluate the logic, validity, and relevance of data;
- ❑ solve challenging problems, and;
- ❑ use knowledge and understanding in order to generate and explore new questions.

form: *diverse teaching styles fully leveraging the experience of the instructor(s)*
objective: *challenge student to find alternate solutions which really solve the problem*
strategies: *integrate Myers-Briggs Personality Indicator, Bloom's Taxonomy of Learning Domains, Perry's Scale for Intellectual and Ethical Development*
evaluation: *instructor, committee (example: Does the student surprise the instructor?)*
improvements: *recognition that the question may be more of a block than a answer is.*

3) Integration and Application of Knowledge

To use information and concepts from studies in multiple disciplines in their intellectual, professional, and community lives. Students can apply knowledge to:

- enhance their personal lives;
- meet professional standards and competencies, and;
- further the goals of society.

form:	*problem-solving projects and examinations, capstone experience*
objective:	*demonstrate ability to have an applied impact based upon acquired knowledge*
strategies:	*"real world" employment context activities*
evaluation:	*review by instructor or advisory group*
improvements:	*emphasis on post-graduate successful employment and/or advancement*

4) Intellectual Depth, Breadth, and Adaptiveness

To examine and organize disciplinary ways of knowing and to apply them to specific issues and problems.

- Intellectual depth describes the demonstration of substantial knowledge and understanding of at least one field of study.
- Intellectual breadth is demonstrated by the ability to compare and contrast approaches to knowledge in different disciplines.
- Adaptiveness is demonstrated by the ability to modify one's approach to an issue or problem based on the contexts and requirements of particular situations.

form:	*foster multi-disciplinary and inter-disciplinary endeavors, change management*
objective:	*balance focus on tactical depth with peripheral vision of strategic breadth*
strategies:	*electives, projects, capstones, certificates, cognate areas, minor areas*
evaluation:	*review by instructor or advisory group*
improvements:	*As Walt Disney said, "Change is inevitable; Growth is optional."*

5) Understanding Society and Culture

To recognize their own cultural traditions and to understand and appreciate the diversity of the human experience, both within the United States and internationally. Students can:

- compare and contrast the range of diversity and universality in human history, societies, and ways of life;
- analyze and understand the interconnectedness of global and local concerns, and;
- operate with civility in a complex social world.

form:	*examine subjective concepts of specific computerization contexts in course*
objective:	*balance objective aspects with generally more-complex subjective aspects*
strategies:	*organizational change management approaches*
evaluation:	*exams and projects*
improvements:	*increased likelihood of operational success*

6) Values and Ethics

To make judgments with respect to individual conduct, citizenship, and aesthetics. Students can:

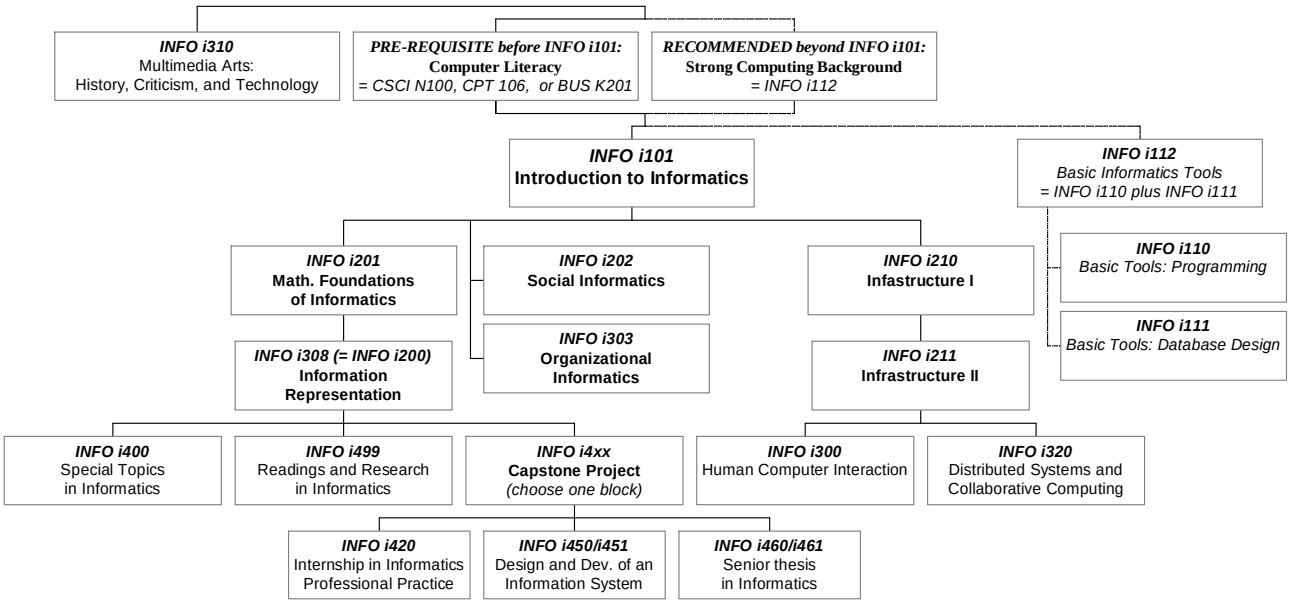
- make informed and principled choices regarding conflicting situations in their personal and public lives and to foresee the consequences of these choices, and;
- recognize the importance of aesthetics in their personal lives and to society.

form:	*examine professional practice, personal privacy and intellectual property protection*
objective:	*recognize competing and conflicting forces coincident with computerization*
strategies:	*review of relevant regulations, legislation, and professional best practices*
evaluation:	*exams and projects (use of quotation and citation, etc.)*
improvements:	*increased credibility for student, school, profession*

VIII. Notes on Course Sequences and Curriculum Blocks

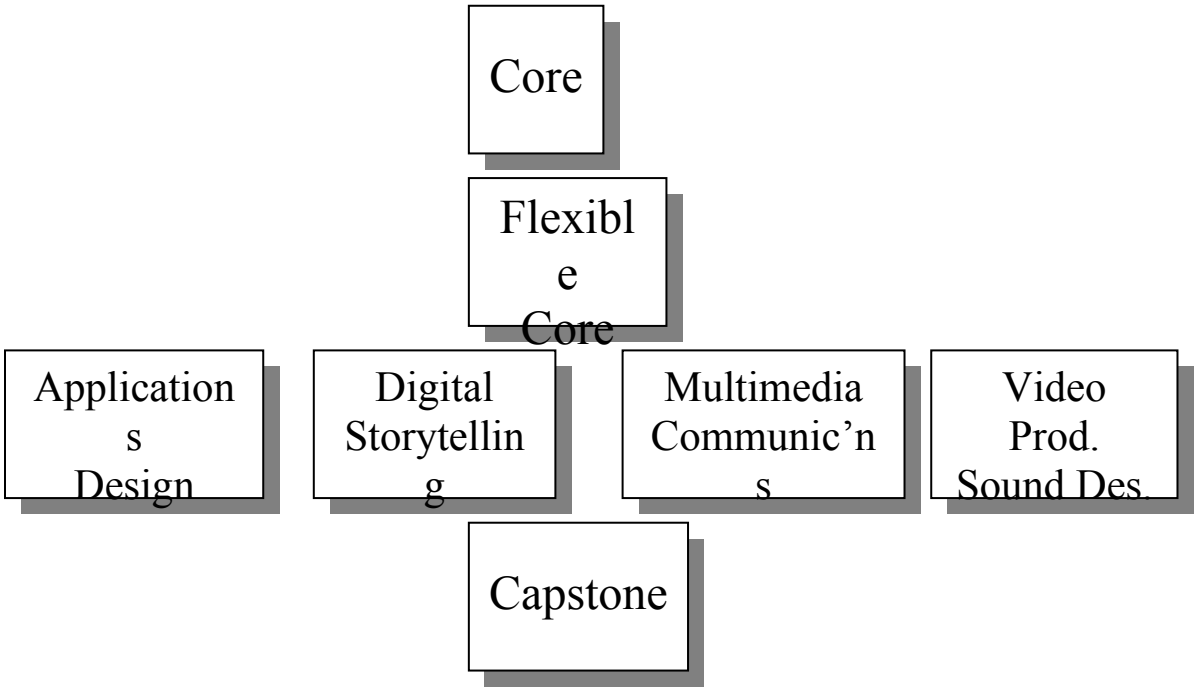
B.S. INFORMATICS

Course Sequences



B.S. MEDIA ARTS AND SCIENCES

Proposed curriculum blocks (see detail listing)



IX. Glossary

Informatics

Informatics is the systematic study of scientific, technical, aesthetic, and organizational aspects of **computerization**, especially how relevant data are managed and informed decisions are made, usually with reference to a specific applied discipline (for examples, Chemical Informatics or Media Informatics).

A systematic study allows analysis and improvement of results and reliability. The idea of computers and computerization is widespread if not common knowledge, and is an appropriate icon for the current era of information technology. The aspects of computerization to be studied include the scientific and technical, plus the equally critical aesthetic and organizational, all in appropriate balance.

- ❑ Scientific/Business: problem definition
- ❑ Technical: solution specification
- ❑ Aesthetic: answer communication
- ❑ Organizational/Political/Social/Legal/Ethical: questions & change management

The realm between the common definitions of relevant data and informed decisions includes many diverse points of view on information and knowledge; regardless, common expectation is that planned outcomes should be decisive and backed by data.

Informatics is an intrinsic integration among many domains with a focus on a specific applied domain, for example Chemistry or New Media or any major area of knowledge where the hunt for relevant data is needed to achieve the goal of making better/faster/cheaper informed decisions.

Main Entry: **com·put·er·ize**
Function: *transitive verb*; Date: 1957
1 : to carry out, control, or produce by means of a computer
2 : to equip with computers
3 a : to store in a computer **b :** to put in a form that a computer can use
http://www.m-w.com/cgi-bin/dictionary?book=Dictionary&va=computerization

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Main Entry: **in·form**
Function: *verb*
Etymology: Middle English, from Middle French *enformer,* from Latin *informare,* from *in-* + *forma* form; Date: 14th century
transitive senses
1 *obsolete* **:** to give material form to
2 a : to give character or essence to <the principles which *inform* modern teaching> **b :** to be the characteristic quality of **: ANIMATE** <the compassion that *informs* her work>
3 *obsolete* **: GUIDE, DIRECT**
4 *obsolete* **:** to make known
5 : to communicate knowledge to <*inform* a prisoner of his rights>
intransitive senses
1 : to impart information or knowledge
2 : to give information (as of another's wrongdoing) to an authority
synonyms INFORM, ACQUAINT, APPRISE, NOTIFY mean to make one aware of something. INFORM implies the imparting of knowledge especially of facts or occurrences <*informed* us of the crisis>. ACQUAINT lays stress on introducing to or familiarizing with <*acquaint* yourself with the keyboard>. APPRISE implies communicating something of special interest or importance <keep us *apprised* of the situation>. NOTIFY implies sending notice of something requiring attention or demanding action <*notified* the witness when to appear>.

Main Entry: **[1]an·i·mate**
Function: *adjective*
Etymology: Middle English, from Latin *animatus,* past participle of *animare* to give life to, from *anima* breath, soul; akin to Old English *Othian* to breathe, Latin *animus* spirit, Greek *anemos* wind, Sanskrit *aniti* he breathes
Date: 15th century
1 : possessing or characterized by life **: ALIVE**
2 : full of life **: ANIMATED**
3 : of or relating to animal life as opposed to plant life
4 : referring to a living thing <an *animate* noun>

Main Entry: **[2]an·i·mate**
Function: *transitive verb*; Date: 15th century
1 : to give spirit and support to **: ENCOURAGE**
2 a : to give life to **b :** to give vigor and zest to; **3 :** to move to action
4 a : to make or design in such a way as to create apparently spontaneous lifelike movement **b :** to produce in the form of an animated cartoon
synonym see QUICKEN

NAICS Industry 51 (Information)

SCOPE

The Information sector (sector 51) of the 1997 Economic Census comprises establishments engaged in the following processes: (a) producing and distributing information and cultural products, (b) providing the means to transmit or distribute these products as well as data or communications, and (c) processing data. The main components of this sector are the publishing industries, including software publishing, the motion picture and sound recording industries, the broadcasting and telecommunications industries, and the information services and data processing services industries.

The expressions ''information age'' and ''global information economy'' are used with considerable frequency today. The general idea of an ''information economy'' includes both the notion of industries primarily producing, processing, and distributing information, as well as the idea that every industry is using available information and information technology to reorganize and make themselves more productive.

For the purpose of developing NAICS, it is the transformation of information into a commodity that is produced and distributed by a number of growing industries that is at issue. The Information sector groups three types of establishments: (1) those engaged in producing and distributing information and cultural products; (2) those that provide the means to transmit or distribute these products as well as data or communications; and (3) those that process data. Cultural products are those that directly express attitudes, opinions, ideas, values, and artistic creativity; provide entertainment; or offer information and analysis concerning the past and present. Included in this definition are popular, mass-produced, products as well as cultural products that normally have a more limited audience, such as poetry books, literary magazines, or classical records.

The unique characteristics of information and cultural products, and of the processes involved in their production and distribution, distinguish the Information sector from the goods-producing and service-producing sectors. Some of these characteristics are:

Unlike traditional goods, an ''information or cultural product,'' such as a newspaper on-line or television program, does not necessarily have tangible qualities, nor is it necessarily associated with a particular form. A movie can be shown at a movie theater, on a television broadcast, through video-on-demand or rented at a local video store. A sound recording can be aired on radio, embedded in multimedia products, or sold at a record store. Unlike traditional services, the delivery of these products does not require direct contact between the supplier and the consumer.

The value of these products to the consumer lies in their informational, educational, cultural, or entertainment content, not in the format in which they are distributed. Most of these products are protected from unlawful reproduction by copyright laws.

The intangible property aspect of information and cultural products makes the processes involved in their production and distribution very different from goods and services. Only those possessing the rights to these works are authorized to reproduce, alter, improve, and distribute them. Acquiring and using these rights often involves significant costs. In addition, technology is revolutionizing the distribution of these products. It is possible to distribute them in a physical form, via broadcast, or on-line.

Distributors of information and cultural products can easily add value to the products they distribute. For instance, broadcasters add advertising not contained in the original product. This capacity means that unlike traditional distributors, they derive revenue not from sale of the distributed product to the final consumer, but from those who pay for the privilege of adding information to the original product. Similarly, a database publisher can acquire the rights to thousands of previously published newspaper and periodical articles and add new value by providing search and software and organizing the information in a way that facilitates research and retrieval. These products often command a much higher price than the original information.

The distribution modes for information commodities may either eliminate the necessity for traditional manufacture, or reverse the conventional order of manufacturedistribute: A newspaper distributed on-line, for example, can be printed locally or by the final consumer. Similarly, it is anticipated that packaged software, which today is mainly bought through the traditional retail channels, will soon be available mainly on-line. The NAICS Information sector is designed to make such economic changes transparent as they occur, or to facilitate designing surveys that will monitor the new phenomena and provide data to analyze the changes.

Many of the industries in the NAICS Information sector are engaged in producing products protected by copyright law, or in distributing them (other than distribution by traditional wholesale and retail methods). Examples are traditional publishing industries, software and database publishing industries, and film and sound industries. Broadcasting and telecommunications industries and information providers and processors are also included in the Information sector, because their technologies are so closely linked to other industries in the Information sector. Data for this sector are shown for establishments of firms subject to Federal income tax. Many of the ''kinds of business or operation'' included in this sector are not thought of as commercial businesses and the terms (such as ''business,'' ''establishment,'' and ''firm'') used to describe them may not be descriptive of such services. However, these terms are applied to all ''kinds of business or operation'' in order to maintain conformity in the measures of the production and delivery of goods and services and in the presentation of data.

Except in the telecommunications industry, the basic tabulations for this sector do not include data for establishments which are auxiliary (primary function is providing a service, such as warehousing or bookkeeping) to service establishments within the same organization. Data for auxiliaries are presented separately.

— *Indiana 1997 Economic Census; Information; Geographic Area Series.* October 1999. EC97S51A-IN. pp 4-5.
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X. Footnotes/Endnotes

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[ii] Oct.2001 public groundbreaking ceremony for CTC/IC bldg. http://www.iupui.edu/news/insider102201.htm

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http://censtats.census.gov/cbpnaic/cbpnaic.shtml [2001 County Business Patterns: Indiana];
http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl [Indiana];
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See also: Metro Business Patterns.
See also: Zip Code Business Patterns.

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[xii] *Break Away Growth – Full Report*, Indiana Economic Development Council Inc. (1997-98). Page 13.
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[xiii] *IS 2002 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems* [a.k.a. Informatics];
Association for Computing Machinery (ACM), Association for Information Systems (AIS), and Association of Information Technology Professionals (AITP)
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See http://www.ecdl.com/ for ECDL Syllabus Version 4.
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[xxx] http://informatics.iupui.edu/academics/minors_certificates.php

[xxxi] http://informatics.iupui.edu/academics/minors_certificates.php

[xxxii] http://www.newmedia.iupui.edu/curriculum/degrees.php?s=asso

[xxxiii] http://www.newmedia.iupui.edu/curriculum/degrees.php?s=bach

[xxxiv] *IS 2002 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems* [a.k.a. Informatics]; Association for Computing Machinery (ACM), Association for Information Systems (AIS), and Association of Information Technology Professionals (AITP) http://www.acm.org/education/is2002.pdf [revised from *IS 1997*], pp.6-7.

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