Integrated Bachelor of Science in Health Sciences and Master of Science in Health Informatics

Indiana University School of Health and Rehabilitation Sciences at IUPUI

Indiana University School of Informatics and Computing at IUPUI

Summer 2014

Integrated Bachelor of Science in Health Sciences and Master of Science in Health Informatics

Signature Sheet

Degree Title: Existing Degrees - BS in Health Sciences and MS in Health Informatics

Indiana University School of Health and Rehabilitation Sciences at IUPUI

Indiana University School of Informatics and Computing at IUPUI

Signature of the Dean	Date
Indiana University School of Health and Rehabilitation Sciences at IUPUI	
Signature of the Executive Associate Dean	Date
Indiana University School of Informatics and Computing at IUPUI	
Dean of the Graduate School	Date

Provost Date

Proposal Summary

The Indiana University School of Health and Rehabilitation Sciences and the Indiana University School of Informatics and Computing, Department of BioHealth Informatics, at IUPUI propose a five-year, integrated BS/MS degree program in which both the BS in Health Sciences and the MS in Health Informatics will be awarded. By designing a curriculum that transition seamlessly from the BS in Health Sciences to the MS in Health Informatics, the program will graduate students who meet all requirements for both degrees. The integrated degree program will also enhance student recruitment and retention for both Schools. Importantly, this accelerated program will dramatically increase the employment options and desirability of individuals receiving the combined degrees.

IUPUI's vision is to be one of the best urban universities, recognized locally, nationally, and internationally for its achievements—and already serves as Indiana's premiere urban research and academic health sciences campus. The campus' mission is to advance the State of Indiana and the intellectual growth of its citizens to the highest levels nationally and internationally through research and creative activity, teaching and learning, and civic engagement. With IUPUI's strong commitment to teaching and research, it promotes the educational, cultural, and economic development of central Indiana and beyond, offering a distinctive range of bachelor's, master's, professional, and doctoral degrees.

Consistent with IUPUI's vision and mission, the proposed program provides students with intensive hands-on experiential and problem-solving learning. The primary benefits of this combined degree program are to broaden students' career horizons by allowing them to receive two degrees in a shorter time frame and at lower costs than it would take to pursue the degrees separately.

This application proposes a fully integrated five-year curriculum, designed to develop student's knowledge, skills, and abilities to apply fundamental informatics principles to solve health-related problems in real-world advanced application areas. Students who complete the program will have greater experience, higher credentials, and be able to contribute more quickly and effectively at their work setting. The integrated five-year BS/MS program has several salient features that are attractive to students and employers, including greater breadth (BS) and depth (MS) of Health Sciences and Informatics fundamentals and an application skillset in Health Informatics; better starting salary upon completion of the program; better career growth opportunities; and better preparedness to meet employment opportunities and challenges. This

accelerated, interdisciplinary program is important for attracting domestic students to graduate studies, especially from central Indiana and the rest of the U.S.

Owing to its accelerated format, the School of Health and Rehabilitation Sciences, Department of Health Sciences, and School of Informatics and Computing, Department of BioHealth Informatics, expect the matriculation of their students will serve to enhance the quality and attractiveness of both the undergraduate and graduate degree programs in which they are enrolled. A sample program of study is included at the end of this document.

Degrees to Be Conferred

Successful students will leave this program with two degrees: a BS in Health Sciences and an MS in Health Informatics. These two programs currently exist.

Rationale and Demand for this Integrated-Degree Program

The Indiana University School of Informatics and Computing (SOIC) was the first school of informatics to be established in the U.S. As similar programs have been started, both within the U.S. and abroad, the SOIC is challenged to implement innovative strategies to meet the needs of the changing education consumer.

Health (or Biomedical or Clinical) Informatics is the interdisciplinary science that deals with biomedical information and its structure, acquisition, and use. It includes research, education, and service in health-related basic sciences, clinical disciplines, and healthcare administration. Health informatics is derived from the disciplines of computer science, information science, cognitive science, social science, engineering, and the clinical and basic sciences. It includes applied and basic scientific work, ranging from theoretical model construction to the building and evaluation of applied systems.

The five-year BS/MS program will provide a seamless integration of the breadth of a Health Sciences background in the BS program with the depth of MS coursework on applying software tools to health data. The proposed program will benefit both international and domestic students while minimizing the investment of time and financial resources necessary to fulfill the degree requirements. This would create highly skilled *health informaticians,* essentially professionals with a strong Health Sciences background, as well as the knowledge and experience on how to apply this background to health informatics.

Rehabilitation Sciences Jobs: Most positions in the rehabilitation science profession require at least a 4-year bachelor's degree with a state certification, yet most employers prefer people with master's degrees and certification. While the employment outlook is projected to remain favorable, students graduating from the undergraduate programs will mostly find jobs in "alternative careers" according to Education Portal such as Physical Therapist Assistant, Athletic training (e.g., high school, college, professional sports, clinics), commercial, community and corporate fitness, health/wellness programs (e.g., hospitals, universities, hotels, recreation agencies), with a yearly income ranging from $16,000 to $ 65,000.

Health or Biomedical Informatics Jobs: There are multiple career paths in health and biomedical informatics, especially as the widespread implementation of electronic health records (EHR) has fueled growing career specializations. The MS in Health Informatics enhances the BS in Health Sciences competencies with those in the technologies and methodologies for processing and managing data, information, and knowledge in healthcare leading to the following careers: Biomedical Informatician, Clinical Applications Analyst, Clinical Data Analyst, Clinical Informatics Consultant, Clinician Leader, Health Information Exchange Specialist, Health Information Manager, Health Information Privacy Specialist, Healthcare Analyst, Healthcare Informatician, Informatics Analyst, Information Systems Lead, Medical Informatician, Project Manager, and Research Informatics Associate.

If students continue on to complete a Ph.D. in Informatics with a Biomedical and Health Informatics specialization, they could become academic faculty at a university, or research scientist for a university hospital, government agency, or pharmaceutical company. Potential careers include Assistant Professor, Post-doctoral Research Fellow, Lecturer, Director of Research, Principal Scientist, IT Application Architect, Senior Data Analyst, Strategic Innovation Manager, Senior Consultant; Behavioral Health Service Manager, Director of Outcomes Research, Safety Assessment Program Leader, Senior Clinical Scientist, Biomedical Informatician, and Senior Healthcare Analyst.

The greatest numbers of jobs are in healthcare settings (hospitals, medical clinics, doctor's offices or nursing care facilities) but also include biomedical and clinical research, consumer health, public health, and imaging. For example, Biomedical Data Analysts work on teams to develop tools for medical information systems and reports for statistical, clinical, and financial analyses. They develop and manage databases to track clinical performance, productivity, and develop dashboards and other tools to support disease management programs, cost and utilization, and

quality and safety metrics. Those earning master's degrees can also become IT trainers, project managers, and consultants.

Health Informatics Projections & Salary: The range of salaries with a health informatics degree is higher than many fields. The average starting salary for health informatics jobs is estimated at $70,000 annually. Salaries peak at about $106,000. Approximately 442,290 individuals are presently employed in health informatics, and at least 78,000 job openings are expected over the next 10 years. CareerBuilder.com rates health informatics jobs as the No. 1 job opportunity in an emerging industry because of the recent federal legislation that has increased their demand. Other factors that contribute to demand for individuals with these skillsets include the anticipated growth in the medical industry, as well as technological advancements that affect biomedical and clinical information availability and computer and clinical innovations, which are developing rapidly.

Objectives of the Dual-Degree Program

The proposed integrated degree program will provide both intensive education and supervised research opportunities to high quality students who are serious about committing to this unique opportunity. Students will receive two degrees in a relatively shorter time period than it would take to pursue the degrees separately---and without dilution of the content of either program. The proposed program will help the Indiana University School of Health and Rehabilitation Sciences and IU School of Informatics and Computing at IUPUI to recruit and retain superior students who will receive both a BS in Health Sciences and an MS in Health Informatics within five years. Most importantly, we believe this will provide greater career opportunities for our graduates in an increasingly competitive job market.

Proposed Program Structure

A. Admission requirement. Students will be admitted to the IU School of Health and Rehabilitation Sciences under the guidelines that currently exist for admitting BS students. The sequence of courses for the first three years will be identical to the courses taken by traditional Health Sciences majors. The students will be made aware of the option to pursue the integrated degree program during their first year and advised appropriately should they wish to pursue it. The program is intended for those Health Sciences students who demonstrate the capacity through their coursework to succeed in this academically rigorous program. Therefore, only highly motivated students would be counseled to enter the integrated BS/MS degree program.

Students interested in applying for the integrated degree program would do so during the sixth semester (beginning of the last semester of the junior year) of their BS in Health Sciences program.

Admission will be selective: the Graduate Admissions Committee evaluates applicants' abilities to succeed academically and their potential to contribute to the field. Candidates for admission to the graduate program would be expected to have completed successfully the first five semesters (at least 75 credit hours) of the BS in Health Sciences, with a cumulative undergraduate GPA of 3.25 or higher.

B. Degree Requirements. The proposed curriculum includes all the core undergraduate courses that are currently required for the BS in Health Sciences and all the graduate course that are currently required for the MS in Health Informatics.

The total credit hours required for this integrated degree program will be 146 hours for those students awarded the BS and MS. For reference, the Bachelor of Science in Health Sciences requires 120 hours and the MS in Health Informatics requires 36 hours, for a total of 156 hours for two independent programs. The integrated program is constructed to exploit an overlap economy, thereby reducing the number of required hours. The undergraduate BS in Health Sciences requires a minimum of 14 hours of general electives. The accelerated program will replace 12 of the 14 elective credit hours with graduate-level courses from the Health Informatics MS program. These substitutions occur in the 7th and 8th semesters of the student's BS program. The graduate level courses satisfy all the BS degree requirements.

Students in the MS in Health Informatics graduate program must maintain a minimum cumulative GPA of 3.0 and earn a minimum of a B– in every course. If a minimum grade is not earned in a course, that course must be retaken. Graduate students cannot replace a grade; if a course is repeated both grades will be applied toward the cumulative GPA. If the cumulative GPA falls below 3.0, students will be placed on academic probation. Students on probation are required to bring up their average GPA to at least 3.0 by the end of the next semester. Failure to do so will result in dismissal from the graduate program.

C. Scope and Size of the Program. The program should be attractive to Health Sciences majors: there have been inquiries on using the graduate courses taken in students' senior years towards a Bioinformatics or Health Informatics degree. During the initial years, it is expected that the program would attract at least five students per year for a period of four years. This is expected to

increase to at least ten students per year during the following years. The first group of students will graduate after the fifth year following the start of the program.

D. Administrative Structure. There will be two plans of study for students in this program:

1) A BS in Health Sciences plan of study that will be filed no later than one semester before completing the BS degree requirements (normally in the sixth semester), and will include the 12 credit hours of graduate courses to be taken in place of the undergraduate general electives, and 2) an MS in Health Informatics plan of study that will be completed after the completion of the BS plan of study (normally in ninth semester).

The two plans of study to be maintained are attached to this document, where the four overlapping courses (12 credit hours) are to be indicated in both BS and MS plans. Granting of the BS diploma will be delayed until the MS is completed, unless the student withdraws from the program. The graduate program will offer thesis and project options. A sample plan illustrating a semester-by-semester distribution of the courses is also attached.

After admission to the accelerated program, the student's performance will be assessed by the Graduate Committee at the end of each semester to ensure that the student's performance is at the level expected for traditional MS students in the Health Informatics graduate program.

If a student's performance is judged by the Graduate Committee to be unsatisfactory for the integrated degree program, the student will no longer be in the program, but still be able to receive a BS in Health Sciences upon completion of all the requirements of that degree.

This degree program will be offered only on the IUPUI campus.

Evaluation Plan

The BS/MS program shall be reviewed and modified each year by a joint committee composed of members of the School of Health and Rehabilitation Science's Department of Health Sciences and the SOIC's Department of BioHealth Informatics. The program, its specializations, and individual courses shall be assessed based on their respective student learning outcomes by direct and indirect measures and with reference to the Principles of Undergraduate Learning and the Principles of Graduate and Professional Learning. Two formal and external evaluations of the BS/MS shall take place during year three and again during year five. The third year review shall be a small one to two-day review that includes a person external to both schools. The fifth year review shall be a systematic three-day review that includes three external people. These reviews are not school reviews, but rather examine the strengths and weaknesses of the BS/MS program.

In both reviews, a written set of recommendations would be delivered to the University Dean of the School of Informatics and Computing, the School of Health and Rehabilitation Sciences, and to the Dean of the Graduate School. Prior to each of these reviews, procedures for the review process shall be established consistent with similar reviews at Indiana University and at comparable institutions.

Sustainability and Impact on the State and Region

The proposed program requires no additional resources and financial support from the school and campus. The key to the success of the program is to make prospective students aware of the availability of the program when they enter the undergraduate Health Sciences program. The seamless transition from undergraduate to graduate programs will greatly reduce the time needed to complete the two degrees when compared to traditional, separate BS and MS degree programs. This proposed program is, therefore, economical and sustainable in the long run.

As our city, state, and nation move towards a technology-based, high-tech economy, we continue to see a critical need for well-educated, trained, high quality informaticians with advanced graduate degrees. We fully expect these program graduates with advanced degrees to have a major impact on central Indiana, the state of Indiana, and the greater Midwest.

Staffing and Infrastructure. Because the program uses existing courses, faculty, and facilities, no additional resources are required.

IU School of Health & Rehabilitation Science@ IUPUI
BACHELOR OF SCIENCE IN HEALTH SCIENCE

Core courses (76 credit hours):

BIOL-K101	Concepts of Biology	5	___ ___ ___
COMM-R110	Fundamentals of Speech Communications	3	___ ___ ___
PSY-B110	Introduction to Psychology	3	___ ___ ___
ENG-W131	Elementary Composition I	3	___ ___ ___
HPER-H195	Principles and Applications of Lifestyle Wellness	3	___ ___ ___
Humanities/Social Science Course		3	___ ___ ___
MATH-153	Algebra and Trigonometry	3	___ ___ ___
MATH-118 or higher may be accepted			
ENG-W231	Professional Writing or ENG-W132 Comp II	3	___ ___ ___
PSY-B380	Abnormal Psychology	3	___ ___ ___
PSY-B310	Lifespan Development	3	___ ___ ___
SHRS-W100*	Learning Community Seminar	2	___ ___ ___
SHRS-W210	Introduction to Rehabilitation	3	___ ___ ___ ONLINE ONLY
SHRS-W211*	Orientation to Health and Rehabilitation Professions	2	___ ___ ___ ONLINE ONLY
(*Student takes either W100 OR W211)			
SHRS-W220	Aging and the Older Person	3	___ ___ ___ ONLINE
SHRS-W250	Health and Rehab Systems Across the World	3	___ ___ ___ ONLINE ONLY
SHRS-N265	Nutrition and Exercise	3	___ ___ ___ ONLINE ONLY
SHRS-W361	Health Promotion/Disease Prevention	3	___ ___ ___ ONLINE ONLY
SHRS-W362	Legal and Regulatory Aspects in Rehabilitation	3	___ ___ ___ ONLINE ONLY
SHRS-W363	Ethical issues in Rehabilitation Services	3	___ ___ ___ ONLINE ONLY
SHRS-W364	Disability and Society	3	___ ___ ___ ONLINE ONLY
SHRS-W365	Diversity Issues in Health and Rehabilitation Services	3	___ ___ ___ ONLINE ONLY
SHRS-W441	Administration and Supervision of Rehabilitation	3	___ ___ ___ ONLINE ONLY
SHRS-W442	Research in Health and Rehabilitation Sciences	3	___ ___ ___ ONLINE ONLY
P: STAT 301 or equivalent course			
SHRS-W445	Program Evaluation Methods in Rehabilitation	3	___ ___ ___ ONLINE ONLY
SHRS-N420	Human Nutrition Through the Lifespan	3	___ ___ ___ ONLINE ONLY
P: SHRS-N265			
HIA-M330	Medical Terminology (or equivalent e.g. CLAS-C209)	3	___ ___ ___
STAT-301 Statistics		3	___ ___ ___

Gerontology Certificate courses (15 credit hours):

SHRS-W220	Aging and the Older Person	3	___ ___ ___ ONLINE ONLY
SHRS-W350	Survey of Programs for Older Adults	3	___ ___ ___ ONLINE ONLY
SHRS-W370	Psychosocial Aspects of Aging	3	___ ___ ___ ONLINE ONLY
SHRS-W375	Physical Change and Aging	3	ONLINE ONLY
SHRS-W410	Service Learning in Geriatrics	3	___ ___ ___ ONLINE ONLY
SHRS-W450	Seminar in Gerontology	3	___ ___ ___ ONLINE ONLY

Global Health and Rehabilitation Studies Certificate courses (15 credit hours):

SHRS-W250	Health and Rehabilitation Systems Across the World	3	___ ___ ___ONLINE ONLY
SHRS-W270	Seminar in Global Rehabilitation and Health	3	___ ___ ___ONLINE ONLY
SHRS-W380	Health and Rehabilitation Professionals in Developing Countries	3	___ ___ ___ONLINE ONLY

SHRS-N460 P: SHRS N265	Global Perspectives in Nutrition, Health, Disease, and Disability	3	___ ___ ___ONLINE ONLY
SHRS-W470	International Service Learning in Rehabilitation	3	___ ___ ___ONLINE ONLY

Rehabilitation and Disability Studies Certificate courses (18 credit hours):

SHRS-W320	Survey of Adaptive Rehabilitation Technology	3	___ ___ ___ ONLINE ONLY
SHRS-W330	Approaches to Rehabilitation Case Management	3	___ ___ ___ ONLINE ONLY
SHRS-W340	Psychological Aspects of Disabilities	3	___ ___ ___ ONLINE ONLY
SHRS-W420	Proposal Writing for Community-Based Rehabilitation Programs	3	___ ___ ___ ONLINE ONLY
SHRS-W430	Practicum in Rehabilitation and Disability	3	___ ___ ___ ONLINE ONLY
SHRS-W440	Medical Aspects of Disabilities	3	___ ___ ___ ONLINE ONLY

Preparation for Graduate Health Professions Programs courses (20 credit hours):

BIOL-N261	Human Anatomy	5	___ ___ ___
BIOL-N217	Human Physiology	5	___ ___ ___
CHEM-C105/125	Chemistry I with lab	5	___ ___ ___
PHYS-P201	General Physics I with lab	5	___ ___ ___

Electives:

The choice of electives will depend on the track chosen and additional knowledge desired.

Please note that some undergraduate courses require prerequisites and it is the student's responsibility to fulfill these requirements.
All SHRS classes must be completed with a C or better to count toward undergraduate degree requirements.

Health Informatics Plan of Study

The Master of Science degree in Health Informatics is a 36 credit hour program that includes 24 credit hours in Health Informatics core courses and 12 credit hours of electives. The students have the options of taking (1) three credit hours towards a thesis, or (2) three credit hours towards a project,

Project track (36 credits)

___	**INFO 501**	Introduction to Informatics [F/S] 3cr
___	**INFO 530**	Foundations of Health Informatics [F] 3cr
___	**INFO 535**	Clinical Information systems [F/S] 3cr
___	**INFO 581**	Health Informatics standards and terminology [S] 3cr
___	**INFO 642**	Clinical decision support systems [S] 3cr
___	**INFO 583**	Security and Privacy practice [S] 3cr
___	**INFO 505**	Information project management [F] 3cr
___	**INFO 691**	Project in Health Informatics [F/S] 3cr
___	**Elective (**3 cr**)**	
___	**Elective** (3 cr)	
___	**Elective** (3 cr)	
__	**Elective (**3 cr)	

Thesis track (36 credits)

___	**INFO 501**	Introduction to Informatics [F/S] 3cr
___	**INFO 530**	Foundations of Health Informatics [F] 3cr
___	**INFO 535**	Clinical Information systems [F/S] 3cr
___	**INFO 581**	Health Informatics standards and terminology [S] 3cr
___	**INFO 642**	Clinical decision support systems [S] 3cr
___	**PBHL 651**	Introduction to Biostatistics [F] 3cr
___	**INFO 575**	Informatics research design [F/S] 3cr
___	**INFO 691**	Thesis [F/S] 3cr
___	**Elective (**3 cr**)**	
___	**Elective** (3 cr)	
___	**Elective** (3 cr)	
__	**Elective (**3 cr**)**	

Other Electives:

Students can take other INFO graduate courses including independent study (INFO 551) as electives. Masters Students can take up to 6 credits outside the School of Informatics and Computing.

BS Health Sciences/ MS HI, 5-Year Plan of Study

Credit hours: 146

Colors: General education requirements, Health Sciences BS required courses within the first two years of program, Health Sciences BS electives, HI MS required courses, *HI MS elective courses*

FIRST SEMESTER (Fall)		THIRD SEMESTER (Fall)		FIFTH SEMESTER (Fall)		SEVENTH SEMESTER (Fall)		NINTH SEMESTER (Fall)	
SHRS - W 100 Learning Comm Sem	2	ENG-W231 or ENG-W132 Professional writing or Elementary Comp II	3	Health science track	3	SHRS-W442 P:STAT 30100 or equivalent Research in Health/Rehab sciences	3	INFO B505 Project Management/ INFO I575 Research Design	3
COMM-R110 Speech Communication	3	PSY-B310 Lifespan Development	3	Health science track	3	SHRS-W445 Program Evaluation	3	Info B590 Health Analytic	3
M118/M119/15300 MATH	3	SHRS-N265 Nutrition and Exercise	3	SHRS-W363 Ethical issues in Rehab Professions	3	Health science track	3	*HI Grad Elective / GRAD B651 Biostatistics I*	3
PSY-B110 Intro. Psychology	3	Core Science	3	SHRS-W364 Disability and society	3	INFO B501 Introduction to Informatics	3		
HPER-H195 Lifestyle Wellness	3	PSY-B380 Abnormal Psychology	3	Elective	3	INFO B530 Foundations of Health Informatics	3		
Elective course	1								
Semester Total	15	**Semester Total**	15	**Semester Total**	15	**Semester Total**	15	**Semester Total**	9

SECOND SEMESTER (Spring)		FOURTH SEMESTER (Spring)		SIXTH SEMESTER (Spring)		EIGHTH SEMESTER (Spring)		TENTH SEMESTER (Spring)	
ENG-W131 English Composition	3	BIOL-K101 Concepts of Biology	5	Health science track	3	SHRS-N420 P:SHRS-N265 Human Nutrition through lifespan	3	INFO 581 Terminologies and Standards	3
SHRS-W210 Intro Rehabilitation	3	SHRs-W361 Health promotion/Disease prevention	3	SHRS-W441 Admin/Supervision of Rehab Organizations	3	Health science track	3	INFO 642 Clinical Decision Support Systems	3
STAT 30100 Intro. Statistics	3	Core humanities or social science	3	Core cultural understanding	3	Elective or Health science track	3	INFO I583 Privacy and Security Procedures & Regulations for Health Care/ HI Grad Elective	3
SHRS-W250 Health/Rehab systems	3	CLAS-C209 or HIA-M330 Medical terminology	3	Core Arts/Humanities or Social sciences	3	INFO B535 Clinical Information Systems	3		
Elective	3	SHRS-W362 Legal/Regulatory aspects Rehabilitation	3	SHRS-W365 Diversity Iss in Health	3	INFO B582 Health Information Exchange	3		
Semester total	15	Semester Total	17	Semester Total	15	Semester Total	15	Semester Total	9
SEMESTER (Summer)		SEMESTER (Summer)		SEMESTER (Summer)		Eighth SEMESTER		TENTH SEMESTER	

						cont.(Summer) (3 credits of electives can be taken the following fall Tenth Semester if desired)		**(Summer) (**3 credits of project can be spread over several semesters if desired; especially thesis may require more time to complete)	
						HI Grad Elective	3	**INFO I691 HI GRAD Project/ Thesis**	3
Semester total	0	**Semester Total**	0	**Semester Total**	0	**Semester Total**	3	**Semester Total**	3
Year-by-year totals	**30**	**Year-by-year totals**	**32**	**Year-by-year totals**	**30**	**Year-by-year totals**	**33**	**Year-by-year totals**	**21**