

USF Academic Program Review:
Master of Science in Health Informatics
v. 2020

I. Mission and History

Mission

University: The core mission of the University of San Francisco (USF) is to promote learning in the Jesuit Catholic tradition. The university offers undergraduate, graduate and professional students the knowledge and skills needed to succeed as persons and professionals, and the values and sensitivity necessary to be men and women for others. The university distinguishes itself as a diverse, socially responsible learning community of high quality scholarship and academic rigor sustained by a faith that does justice. The university draws from the cultural, intellectual and economic resources of the San Francisco Bay Area to enrich and strengthen its educational programs.

School: The mission of the School of Nursing & Health Professions (SONHP), aligning with the USF mission, is to advance nursing and health professions education within the context of the Jesuit tradition. The school uses dynamic and innovative approaches in undergraduate and graduate education to prepare professionals for current and future practice domains. The goal is to effectively link classroom, clinical, and field experiences with expectations for competence, compassion, and justice in health care, protection and promotion within the context of the highest academic standards.

The School of Nursing Mission, Vision, and Values were reviewed and developed in the fall of 2006 and adopted by the school in January of 2007. This work established the framework for review of the programs and their expected outcomes in light of the innovations in nursing and provided significant ground work for expanding the school to include other health professions' programs. With the expansion of the school to include other professional programs and re-naming of the School to Nursing and Health Professions (SONHP), the Vision, Mission, and Values were once again reviewed and updated to be more inclusive, adopted by faculty on September 12, 2011. All of the health professions programs are part of the SONHP strategy to educate future health professionals with an inter-professional approach and move forward in creating a learning environment that prepares the graduate for the "real world."

The school undertook an Organizational Transformation Project (OTP) in 2018 that involved the entire school community, faculty, staff and students through the review and adoption process. The aim of the OTP was to develop a deep understanding of the School's organization and, together, design a future state organization to better seize strategic opportunities, mitigate risk, and establish strong, lasting organizational improvements. The OTP outlined the SONHP operating and organizational model, capability model that defined the key capabilities that the School must possess to deliver and sustain results/achieve outcomes, and strategic and performance measurement. The OTP outlines a clear transformational roadmap that includes workstreams and project milestones from 2018 to the present day.

Program: The goal of the Master of Science in Health Informatics (MSHI) program is to prepare graduates who are educated in the broad and rapidly evolving field of health and biomedical informatics: having an in-depth understanding of the challenges, legal and security issues, data standards and tools and the ability to independently solve problems and analyze data, who will use their knowledge and skills to successfully solve real-world data-driven health and health care problems and communicate those solutions effectively. The MSHI program at USF is unique in providing rigorous technical education, while focusing on the use of digital health technologies for solving the most pressing clinical needs, particularly in underserved populations, both domestically and globally. The MSHI program goal aligns with the University and School mission statements through the focus on advancing health informatics education through a social justice lens.

History

In 2010, the School of Nursing, taking seriously the Institute of Medicine Report on The Future of Nursing <http://thefutureofnursing.org/recommendations> regarding the call for expanding opportunities for nurses to lead and diffuse collaboration (Recommendation #2) and preparing nurses to lead change (Recommendation #7), actively started on a trajectory to add non-nursing health professions programming to its portfolio. As a result of a commitment to health professions education, then USF President Fr. Stephen A. Privett named a President's Commission on Health Professions Education that was charged to build on the stature of the USF nursing programs to make recommendations to advance excellence in non-nursing health professions education by developing additional educational options at USF. The first non-nursing health profession program was the Master of Public Health (MPH). It was with this addition that the School changed its name to School of Nursing and Health Professions (SONHP). The departments in SONHP have nursing and non-nursing degree options clustered around contemporary ways to conceptualize health, health care, and clinical practice.

The USF MSHI program was added to SONHP in response to the ever-increasing role data plays in the healthcare field, as huge amounts of data are collected in, for example, Electronic Health Record (EHR) systems, precision medicine, and wearable devices. William Bosl, PhD was hired as director of the program in Summer 2013, and the first group of students were admitted and began taking classes in Spring 2014. The program was designed to prepare students to become professional health informaticists immediately upon graduation, to pursue advanced doctoral level training in a related health field, and to lead as this new and rapidly changing field evolved. Hence, the MSHI program required its students to become knowledgeable in clinical, business, and policy aspects of the healthcare industry and proficient in health data analysis. Rather than utilizing the cohort model, the program was initially designed to be flexible to allow both full-time and part-time students to work through requirements at a pace suited to their needs. The program continued to evolve and implemented a revised curriculum map starting in Fall 2018 that enabled full time students to complete the program in 12 months. Part-time students may still pursue a slower pace, but even taking 1 course per semester students will finish in 3 years.

The MSHI program has developed an ongoing self-assessment process to systematically evaluate various aspects of the program. As the health informatics field is relatively new and continues to evolve rapidly, there is no accreditation process as of yet for Master's-level health informatics programs. Physicians now have a defined path to board certification in Clinical Informatics that requires, among other things, a two-year post-residency fellowship in an approved Clinical Informatics program. AMIA (American Medical Informatics Association) is currently in the process of creating an Advanced Health Informatics Certification that is intended to parallel the physician's clinical informatics program, but for non-physician healthcare professionals. Draft guidelines were released for discussion at the annual AMIA meeting in November 2017. Discipline-specific expectations for domain knowledge and competencies are in draft form at this point. Importantly, it remains unclear whether certification will be widely accepted as a necessary credential for professional entry into the field or if health informatics will follow academic disciplines, such as computer science, more closely. In the latter case, academic credentials, personal creativity, and technical skills, as demonstrated by published achievements, interviews, and company-administered tests are the primary standard for employment. The increasingly close alignment of health informatics and the emerging field of Data Science suggest that the accreditation path may take different forms for different roles. Data Science credentials typically do not involve an accreditation process, but rely on academic credentials and technical skills learned through experience.

At this time, there is no externally administered competency exam, although there are plans to create one along with the Advanced Health Informatics Certification. As mentioned, this may not become a universal credential for all practitioners, particularly health data scientists. Because Health Informatics is a rapidly evolving field, MSHI faculty must continually identify skills and knowledge needed to prepare students for careers in the field. Vehicles for this include active participation in research collaborations in the field, reading professional journals, participation in the AMIA Academic Forums regarding professional competencies, attending conferences, and seeking advice from MSHI Advisory Board and practicum preceptors. Participation in research and scholarly activities is deemed by the faculty to be critically important to staying relevant in teaching functions and is not an independent activity. Faculty experts in the various subdomains of health and biomedical informatics are essential for teaching graduate level courses.

II. Curriculum

General

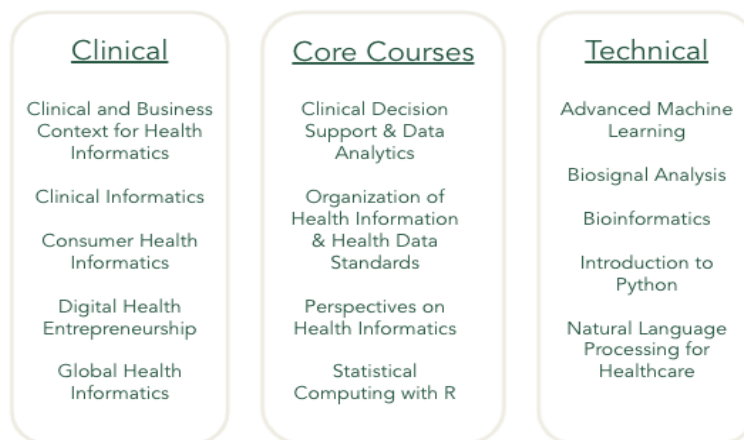
The Master of Science is the only degree offered in the Health Informatics program, although there is also an Executive Certificate in Health Informatics. The key focus of the MSHI program is the close collaboration between healthcare professionals and technology professionals. This is reflected in the curriculum by a balance of both qualitative and quantitative courses.

The founding faculty included those with experience in academic research and the digital health industry. Additionally, an advisory board was constituted, consisting of a bioinformatics venture capitalist and healthcare lawyer and informaticist.

Courses follow the University policy and were initially 3 units per course. However, the program shifted to 4 units per course in order to better concentrate both student and faculty focus.

Health Informatics is a very broad field with a multitude of programs that have varying focuses. The MSHI program is closely aligned with those programs that are focusing on the management and analysis of healthcare data, such as the program offered by Temple University. It is also closely aligned with a UCSF program though the official degree is the MS in Clinical Research, Data Science Track.

Curriculum Overview



The program learning objectives are:

- Lead the development and application of emerging information technologies to improve all aspects of health care delivery.
- Master the “language” of health care, navigate the rules around using medical data, and utilize relevant information to assess changes in the healthcare system.
- Utilize health information technology for decision support, knowledge management, strategic planning, and outcomes assessment.
- Effectively interface between the technology developers and the clinical user community.
- Assure that healthcare information technology advances patient information security and confidentiality and promotes ethical health care decisions.

The general goal of the program is to help bridge the current gap in industry between healthcare stakeholders and technologists with respect to the management and analysis of healthcare data. For example, at Genentech/Roche there are data scientists who sit on

hundreds of real-world datasets who are unable to fully realize the potential of the data because they are constantly relearning and retooling their analyses for each dataset. However, the technologists are responsible for building the infrastructure to support the analyses; yet, the technologists and data scientists have trouble communicating effectively. There are evidence-based practices that combine domain knowledge with semantic computing technologies to bridge this gap. This is referred to as “medical informatics.” Again, informatics as a general field is quite broad, but the MSHI program fits the above example perfectly.

Historically, the program has not explicitly set diversity goals and objectives. However, the program has also historically overrepresented females and people of color, especially in the context of STEM programs.

The curriculum and PLOs map as follows:

- Lead the development and application of emerging information technologies to improve all aspects of health care delivery.
 - o HS 610 Perspectives in Health Informatics
 - o HS 611 Semantic Organization of Health Information/Data Standards
 - o HS 614 Clinical Decision Support and Health Data Analysis
 - o HS 650 Capstone Project in Health Informatics
- Master the “language” of health care, navigate the rules around using medical data, and utilize relevant information to assess changes in the healthcare system.
 - o HS 611 Semantic Organization of Health Information/Data Standards
 - o HS 619 Natural Language Processing for Healthcare
 - o HS 620 Digital Health Entrepreneur
 - o HS 621 Clinical and Business Context for Biomedical Informatics
- Utilize health information technology for decision support, knowledge management, strategic planning, and outcomes assessment.
 - o HS 608 Computer Science for Health Informatics Professionals
 - o HS 614 Clinical Decision Support and Health Data Analysis
 - o HS 619 Natural Language Processing for Healthcare
 - o HS 630 Bioinformatics
 - o HS 631 Statistical Computation for Biomedical Informatics
 - o HS 650 Capstone Project in Health Informatics
- Effectively interface between the technology developers and the clinical user community.
 - o HS 610 Perspectives in Health Informatics
 - o HS 650 Capstone Project in Health Informatics
- Assure that healthcare information technology advances patient information security and confidentiality and promotes ethical health care decisions.
 - o HS 610 Perspectives in Health Informatics

Advising

Students are assigned to full-time faculty with an opportunity to switch to an advisor who may best fit their career ambitions or other needs. Once accepted, the faculty have routinely gone above and beyond in helping students with their career trajectories, including typical advising as well as job and internship placements.

Overall Academic Quality

The program has been extremely successful in accepting students with a diversity of excellence and achieving, at one point (Dec 2018), a 100% in-field job placement rate. Of course, this number ebbs and flows since students typically find employment within 6-18 months of graduation. The advancement of two students on to Medical Scientist Training Program (MSTP) programs demonstrates the academic rigor and ability for the MSHI to train students for careers in both clinical medicine as well as research.

III. Assessment of Student Learning

Program Learning Outcomes

- Lead the development and application of emerging information technologies to improve all aspects of health care delivery.
- Master the “language” of health care, navigate the rules around using medical data, and utilize relevant information to assess changes in the healthcare system.
- Utilize health information technology for decision support, knowledge management, strategic planning, and outcomes assessment.
- Effectively interface between the technology developers and the clinical user community.
- Assure that healthcare information technology advances patient information security and confidentiality and promotes ethical health care decisions.

Measuring Student Outcomes

The MSHI program utilizes the approaches listed below to measure student outcomes from the program. Faculty meet regularly to discuss the results of these metrics, evaluate the effectiveness of our program, and formulate plans to improve it. Members of our program support staff take minutes of the meetings to capture deliberations and decisions so as to enhance their actionability. Beginning this year, faculty and the Health Informatics Professional Student Association (HIPSA) will jointly host a yearly meeting with our students wherein a report on the state of the MSHI program is delivered. This will include results of MSHI outcome measurements, faculty and student evaluations of the program, and plans for improvement. Alumni will be invited. The following outcome measures will be discussed:

- Employment Rate
- Retention rate

- Time to completion
- HS 614 final
- Preceptor capstone evaluation
- Student yearly evaluations
- Entrance/exit survey

<u>Measure</u>	<u>Time or frequency</u>
1. Related Employment Rate	6 months after graduation
2. Program retention rate	1 – dropout rate after 1 year
3. Time to completion	Recorded when student graduates
4. Grade on HS 614 final	When student completes this class
5. Preceptor Capstone evaluation	Filled by preceptor upon completion of project
6. Student yearly evaluation	Yearly completion by student
7. Student Exit survey	Upon or near graduation

1. Employment rate:

Employment rates of our students are tracked 1) immediately upon graduation and 2) within 6 months of graduation. The expectation is that, within 6 months of graduation, nearly 100% of MSHI graduates have received an offer of employment working with data and/or information systems within the healthcare field. There is a separate check on the employment rates of subgroups of students (ex: online students, F1 visa students) and plans are made to address any gaps in employment levels between groups.

2. Retention rate:

It is expected that recruiting procedures result in admitted students that are a good match for the MSHI program in terms of both interest and ability. It should be communicated clearly during the application process that the MSHI program is rigorous and that graduates are expected to acquire sufficient knowledge of healthcare systems and culture to work effectively with diverse healthcare professionals and to become proficient in technical aspects of informatics to work independently to solve biomedical informatics problems in a team environment. Successful recruitment strategies, along with a well-designed and delivered curriculum, are expected to result in retention rates of 80% or higher. Retention of subgroups of students (ex: online students) are tabulated as well as retention by the semester students were admitted.

3. Time to completion:

The MSHI program was designed and marketed as being flexible as to the number of semesters to complete the program. The program is not at this point a cohort model, although changes implemented in Fall 2018 will create a cohort type feel for full-time students. Ambitious full-time students can complete the MSHI program in as few as 3 semesters or 12 months. Part-time students who take 1 course continuously will finish in 3 years. A goal for time to completion was arbitrarily set at 70% in 6 semesters; this did not suit the flexible MSHI program as it was implemented. A goal of 70% program completion in 9 semesters was more reasonable and would not require students to attend summer semesters. However, the reorganized Fall

2018 curriculum, which uses 4-unit classes rather than 3-unit classes, is expected to shorten the graduation time for most students.

4. Direct Measure of Student Performance - HS 614 final:

In HS 614 (Clinical Decision Support and Data Analytics) students synthesize their understanding of health data standards with their computational skills to analyze data and perform data analytics. This course is the most challenging course that must be passed in order to qualify for placement in a Capstone. It builds on and integrates material from all of the core courses and requires students to synthesize and apply skills creatively to new problems. A rubric has been developed to rate students' achievement of our PLOs. It is expected that at least 75% of HS 614 students attain or exceed minimum proficiency in each rated PLO. (See appendix 1 for rubric).

5. Preceptor capstone evaluation:

A rubric has been developed for preceptors to comprehensively evaluate student performance in their capstones. Preceptors evaluate student preparation (knowledge and skill level), professionalism, ability to work independently with minimal supervision, timeliness, communication and overall performance. It is expected that at least 75% of capstone students attain or exceed each preceptor minimum standard. Additionally, the evaluation form solicits information that we use to improve our program in preparing students for the job market. Preceptors are asked what went well and what could be improved in the capstone experience. They are asked for advice on preparing students for careers. (Preceptor Capstone Evaluation form is:

https://docs.google.com/forms/d/e/1FAIpQLSeD0FHltDgwdgNK-RrD6r5ynGCu8YoaVoxiyKF80yUz8yUS9g/viewform?usp=sf_link).

6. Student yearly evaluations:

Beginning May 2017, at the end of each academic year, students will anonymously complete the Yearly Evaluation (see appendix 2). This survey has been designed by faculty and students to capture students' feedback on various aspects of the MSHI program as well as students' self-assessments on their progress in achieving the PLOs. As part of the survey, students are asked to assess how well the MSHI program has helped them to attain domain knowledge and skills tied to MSHI PLOs (managing data, independently solving problems and analyzing data). Students are also asked to give feedback on curriculum, teaching effectiveness, logistics, etc. of the MSHI program. The survey will be administered, tallied, and reported to faculty by students through HIPSA. MSHI Faculty will review theses data and create a program improvement plan, which will be discussed with students and alumni at a yearly meeting on the state of the MSHI program.

7. Entrance/exit survey:

Beginning in Fall 2017 students will be surveyed as to their technical skills and healthcare domain knowledge at the time of entry into the MSHI program. Students will be asked to assess themselves in regard to the MSHI PLOs. Upon graduation, students who have filled in an entrance survey will be surveyed regarding these same skills. It is expected that over 80% of graduating students self-assess significant or large gains in the surveyed skills from entrance to

graduation, and that most students self-assess large gains. The survey will also question students as to their satisfaction with the MSHI program and suggestions for improvement. (See appendix 2 for survey).

IV. Faculty

The MSHI faculty consist of a trained medical informaticist, a behavioral neuroscientist with extensive experience in medical informatics, and a computer scientist with an emphasis on computational biology. Additionally, the full-time faculty are augmented with adjuncts from a variety of disciplines ranging from digital health entrepreneurship to law.

The full-time faculty designed the course curriculum and used feedback from the advisory board as well as practicum partners and other industry relationships. Early on, the program was a member of the American Medical Informatics Academic Forum, providing access to program leadership of other informatics programs throughout the United States (ranging from undergraduate to post-doctoral fellowships). However, this membership was canceled due to budget constraints.

The MSHI program faculty come from diverse backgrounds, both professionally and culturally. The faculty are comprised of 2 full-time, tenure-track assistant- and associate-level professors with formal training in computer science, biomedical informatics, and neuropsychology. Adjunct faculty who have taught in the program come with backgrounds in clinical practice (e.g., RN and MD), business/entrepreneurism, and computer science.

The MSHI faculty has changed since the summer of 2020 with the retirement of Patricia Francis-Lyon and the departure of Andrew Nguyen to a position in private industry. Freddie Seba was then appointed into the role of Program Director for the MSHI program.

Full-time Faculty

William Bosl
Doctor of Philosophy in Behavioral Neuroscience
Boston University
Doctor of Philosophy in Geophysics
Stanford University

Patricia Francis-Lyon
Doctor of Philosophy in Computer Science and Computational Biology
University of California, Davis

Andrew Nguyen (Program Director)
Doctor of Philosophy in Biological and Medical Informatic
University of California, San Francisco
Fellow, American Medical Informatics Association

Adjunct Faculty (sample)

Freddie Seba
Master of Business Administration
Yale University

Jordan Freitas
Doctor of Philosophy in Computer Science, Candidate
University of California, Berkeley

Teaching

William Bosl
HS 610 Perspectives in Health Informatics
HS 612 (elective) Biosignal Analysis and Quantitative EEG
HS 616/630 Statistical Computation for Biomedical Data Analysis
HS 650 Capstone Project in Health Informatics

Patricia Francis-Lyon
HS 608 Computer Science for Health Informatics Professionals
HS 614 Clinical Decision Support and Health Data Analysis
HS 616/630 Statistical Computation for Biomedical Data Analysis
HS 650 Capstone Project in Health Informatics

Andrew Nguyen
HS 610 Perspectives in Health Informatics
HS 611 Semantic Organization of Health Information/Data Standards
HS 612 (elective) Biosignal Analysis and Quantitative EEG
HS 614 Clinical Decision Support and Health Data Analysis
HS 619 Natural Language Processing for Healthcare
HS 650 Capstone Project in Health Informatics

Adjunct Faculty
HS 608 Computer Science for Health Informatics Professionals
HS 611 Semantic Organization of Health Information/Data Standards
HS 620 Digital Health Entrepreneur
HS 621 Clinical and Business Context for Biomedical Informatics

Courses taught up to the 2018-2019 academic year were all 3 units each. Starting Fall 2018, courses were changed to 4 units each. HS 650 is a variable unit course with a student effort expectation of approximately 10 hours per week per unit.

Given the interdisciplinary nature of the field of health informatics, the current faculty (including both full-time and adjunct) provide a unique opportunity for students to learn from a variety of perspectives. The faculty bring specific technical expertise in computer science as well as healthcare domain experience, both administratively and clinically. Given the proximity of our program to Silicon Valley and the startup ecosystem, we have also engaged adjunct faculty with specific experience in entrepreneurship and digital health. Additionally, two of our full-time faculty are also involved in digital health startups as founders and advisors.

The current curriculum reflects the diversity of the faculty as well as the field of informatics. Courses range from deeply technical to higher level perspectives of the delivery of healthcare. The use of adjuncts is also a net positive to the program since we are able to incorporate direct, “boots on the ground” experience into the classroom. The field of informatics and its role in healthcare is constantly changing; maintaining this direct connection to the real-world practice of informatics is a tremendous asset.

Our core courses are typically load-balanced between faculty with electives assigned to faculty with appropriate experience. For example, we have typically load balanced HS 608, HS 610, HS 611, HS 614, and HS 618. Where possible, our goal is to have at least two affiliated faculty (full-time or adjunct) available to teach any particular course. This provides the necessary depth to execute our program in case an adjunct is unable to teach in a particular semester or if full-time faculty are fully loaded among other courses and release time.

Generally speaking, our goal has been to have faculty teach a course at least 2-3 times before trading the course with a different faculty member. This allows both individual faculty and the program to refine and improve the execution of a course and its content over several consecutive course offerings. However, by encouraging trading of courses, we are able to integrate new ideas into both the content, and delivery and execution of the course.

Given the interdisciplinary nature of our program and, thus, the faculty, our full-time faculty have taught in other programs. Our faculty have taught in Computer Science, Executive Leadership – Doctor of Nursing Practice - Executive Leadership, and Doctor of Psychology-Clinical Psychology. The intent behind interdisciplinary teaching assignments is to maintain the bulk of a faculty’s appointment with the home program while simultaneously encouraging interdisciplinary education and training. There is an immediate benefit to students in other programs; but, more importantly, there is a direct benefit to the faculty and the informatics program as we continue to learn from the perspectives of other health professions and bring that knowledge back to the training of informaticists.

As a relatively small university and school, the faculty are able to work very closely with the administration to explore the overall curriculum needs and propose new courses fairly quickly and easily. The faculty and program leadership are constantly evaluating the needs of both students and industry partners and integrating this feedback into the curriculum. At program meetings, the faculty discuss what is working well and areas for improvement across all of our courses, both technical and non-technical.

Student demographics and needs vary widely given the diversity of the MSHI program. As a result, our faculty have developed a variety of techniques to integrate general tools such as Slack (semi-real-time instant messaging platform) and Zoom (video conferencing platform) to communicate with students. We have also integrated computing-specific tools such as GitHub, Google Compute Platform, Jupyter Notebooks, etc. to enable collaboration between students and with faculty.

The University and School use the BLUE evaluation system for monitoring teaching effectiveness. In addition to this tool, the program also offers a survey for students to provide more direct feedback. Also, given the small size of the program, faculty are constantly soliciting feedback on teaching effectiveness and curriculum needs directly from students.

All faculty, both full-time and adjunct, are involved with mentoring students. Mentorship typically takes one of three forms – HS 650 (Capstone Projects), HS 651 (Special Projects), and HS 699 (Directed/Independent Study). Through the above mechanisms, faculty mentor students on real-world projects that are either part of a larger research project, or a collaboration with industry partners. As a program, students continue to develop additional projects that are not always directly delivered through traditional courses such as collaborating with large teams, dealing with uncertainty, and managing conflicting needs of stakeholders.

Research

Bill Bosl's research has focused primarily on the use of medical informatics in the context of neurodevelopmental disorders. His research has resulted in two publications within Nature Group journals in addition to a \$200k grant on behalf of the Koret Foundation.

Andrew Nguyen's research has focused primarily on the computable, semantic understanding of clinical data with a particular emphasis on natural language processing and graph technologies. His research has been widely disseminated at leading informatics conferences such as the American Medical Informatics Association. Given his close relationship with industry, much of his research has been incorporated into digital health startups (e.g., Grey Matter Technologies, qlaro).

Patricia Francis-Lyon's research has focused primarily on machine/deep learning and applications in bioinformatics, with a particular emphasis on genomics. Her research has been presented and published in both computer science and bioinformatics communities, highlighting the interdisciplinary nature of her work.

Service

Andrew Nguyen's service includes the IRB as well as a Policy Board representative.

Bill Bosl's service includes the Chair of the Research Committee at the American Clinical Neurophysiology Society (ACNS), the first non-physician to do so.

Patricia Francis-Lyons' service includes the Digital Teaching and Learning committee as well as the faculty advisor for the Health Informatics Professionals and Student Association.

Relationship with other Departments and Programs

Early on, the MSHI program collaborated closely with the Master of Science in Digital Science (MSDS) program, even sending several students to participate in their bootcamp and coursework. However, subsequent cohorts of MSHI students failed to meet the standards required by the MSDS program.

Recruitment and Development

The program is in need of formally-trained medical informaticists given the breadth and depth required to build a successful Health Informatics program. However, these professionals are in very high demand given the explosion in digital health (on top of existing demand by medical centers, biopharma, and payers).

V. Departmental Governance

Departmental Structure: Provide a description of the sufficiency of resources and support services to achieve the program mission and objectives.

The University of San Francisco recognizes the USF Faculty Association (USFFA) as the exclusive collective bargaining representative of faculty members for the purpose of collective bargaining with respect to wages, hours and conditions of employment
http://www.usfca.edu/uploadedFiles/Destinations/Offices_and_Services/General_Counsel/usffa_cba.2013-2018.pdf

Faculty participation in the governance of the University is outlined in the USFFA Bylaws <http://www.usffa.net/wp-content/uploads/Entire-bylaws-clean.pdf>. There are dozens of university-wide committees and almost all of them have a SONHP faculty representative. Some of the University committees are part of the USFFA Faculty Governance; others are part of the Provost's or President's network to engage faculty across all schools and colleges in the decision-making of the University. Not only are faculty from the School on these University committees, staff as well as students serve.

The Faculty Association of the School of Nursing and Health Professions (FASONHP) identifies in its ByLaws (Appendix F) eight (8) standing committees: Curriculum, Faculty Development, Program Evaluation, Peer Review, Academic Standards, Simulation, Digital teaching and learning, as well as Diversity, Equity and Inclusion. There are student members on the Curriculum and Program Evaluation Committees. At the last spring semester meeting each year, a chairperson is elected by committee members. An Associate Dean co-chairs the Curriculum and the Program Evaluation Committees and the Dean serves as co-chair of the Faculty

Development Committee and is an advisor to the Academic Standards Committee. All committees meet monthly and the minutes are posted for faculty review on the Jade Server and will be available to site visitors for review in the resources files site.

The School is currently organized into three departments: Undergraduate Nursing, Graduate Nursing and the Health Professions. The MSHI program is located in the Health Professions Department which has worked to integrate student activities through the Population Health Sciences Student Association (PHSSA) and a common event for graduating student presentations, Health Professions Day.

There is a chairperson and a chairperson-elect for each department, elected by faculty and accountable to the Dean. Department chair duties include, but are not limited to: “communication with faculty, student advising, scheduling, budgeting, program development and review, recruitment, report writing, planning department functions, working with the Dean on administrative responsibilities, evaluation and review of appointment procedures, reporting to the Dean on faculty accountability for workload or for funds spent for departmental activities, curriculum and the like.”

<http://www.usffa.net/wp-content/uploads/usffacba.2013-2018.pdf>. The department chairperson is compensated with three units of release time each semester. Within the department there are program directors who are appointed by the Dean and who are responsible for the management and oversight of the Academic Affairs of the individual program. They work with their department chairperson and attend the SONHP Leadership Council Meetings. These programs directors are compensated with a varied number of release time units depending on the individual program needs and structure.

VI. Students

Over the past 5 years (Fall 2015- Summer 2020) we have had **89** graduates from the MSHI program, from **145** students who have enrolled. The MSHI program also has a certificate program but has only had a single graduate to date (Fall 2020).

Demographics

Professional Background:

Current students:	57% healthcare	43% non-healthcare
Graduates:	55% healthcare	45% non-healthcare

Gender Identity:

Current students:	39% male	61% female	0% non-binary
Graduates:	27% male	70% female	3% non-binary

Residency:

Current students:	49% F1/international	51% domestic
Graduates:	41% F1/international	59% Domestic

Upon graduation, students have been placed at a variety of organizations ranging from startups (e.g., Albeado, Wavelet Health, Grey Matter Technologies) to large companies (e.g., Genentech, Bristol Meyers Squibb) and medical centers (e.g., Sutter Health, Veterans Affairs, Cedars Sinai). This highlights the great success of the program to meet industry needs at all levels. The program has generally used job placement as a rough measure of the overall achievement of the goals and objectives for the program. While it fluctuates from semester to semester, the program achieved 100% in-field job placement of all graduates in December 2018. These job placements ranged from immediately to 12 months after graduation. Two students have gone on to medical scientist training programs (MSTP), a fully supported dual MD/PhD degree program. Based on the recent graduate survey data in December of 2019, the program has had 97% of the graduates employed in the field within 6 months of graduation. All but one graduate is actively employed in a health informatics position; one graduate took a year off from seeking employment as they started their family with their first child.

The MSHI program adheres to the SONHP graduate admissions and transfer policies.

The recruitment of students has been a challenge for the program. Aside from the trends as evident in the data, enrollment projects over the next 5 years were anticipated to remain unchanged due to challenges in areas of marketing and recruitment. Namely, there have been immense challenges in attracting qualified applicants that can participate in an on-ground/in-person program. An example of recruitment challenges is that the MSHI program is very similar to the MS in Data Science (formerly MS in Analytics) program. The MSHI program does include recruitment of students who were not accepted into the MSDS program and many of these applicants indicated that, while they have an interest in healthcare applications of data science, they were not aware that the MSHI program was available at USF.

While COVID-19 was a contributing factor, the program has seen decreasing enrollment over the years. The school and university marketing teams have not been able to establish a cohesive recruitment strategy and have attempted strategies ranging from ads in Men's Fitness to search words that were tangential to the program. Most of the strategies have resulted in only minimal increases in the development of admission leads (i.e. personal outreach to undergraduate and graduate advisors, LinkedIn inmail messaging, and Google/Facebook campaigns). Some strategies are yet to be explored (i.e. YouTube video campaign, Princeton Review, and B2B partnerships) and some are only recently in development and thus there is not longitudinal data to assess effectiveness (i.e. USF inter-program/college events, and WAAHP). There have also been situations in which the program faculty were consulted by OMC on search terms/ad words that were then not used in the intended subsequent campaign.

Based on the demographics of the successfully admitted student, the faculty have hypothesized that the marketing campaigns may not be promoting the program within the appropriate demographics, and an overreliance on international students is vulnerable to federal immigration policies. As a result of the regular underperformance in the area of admission

targets, the decision was made to suspend enrollment for AY20-21, pending a review and adjustment of the program and the associated outreach campaigns.

VII. Staff

The MSHI program shares a Program Administrator and a Program Assistant with the MPH program.

VIII. Diversity and Internationalization

The program has a relatively high international student population (50-60%) and overrepresents females for a STEM program. Generally, the program has an extremely diverse student population. Please refer to the section VI Students.

IX. Technology and Informational Resources

Information Technology Services: <http://www.usfca.edu/its/>

The USF Information Technology Services division provides infrastructure and services in support of our community's teaching, learning, research, and service activities. We strive to provide a high level of service to all members of our community. For help with any ITS service, please contact the ITS Help Desk at itshelp@usfca.edu or 415-422-6668. You can also create a service ticket or look for answers to questions online 24 hours a day with USF Support. Student USF Connect accounts, including access to email, are created automatically at the time of admission and login information is sent via USPS and personal email. Access to auxiliary services, including Canvas (LMS) and the USF network, is added upon receipt of an admission deposit or space reservation.

SONHP faculty use the LMS Canvas for students enrolled in courses on the Hilltop, in the Branch Campuses and for Online courses. All classes use the LMS to support on-ground classes and faculty use this system to communicate course information and the Student Portals provide a vehicle for all school information to be communicated to both students and faculty in a common resource.

USF Connect: www.usfconnect USF Connect is a central electronic resource where members of the USF community can access all of the web-based information and services they need. Using a single username and password, students, faculty, and staff can get and send e-mail, keep a personal calendar, access administrative services, access and deliver online course materials, and form dynamic group sites around common interests.

Center for Instruction and Technology (CIT): <http://www.usfca.edu/its/learning/cit/>

The Center for Instruction and Technology is a teaching, learning, and research facility designed to provide USF faculty, staff, and students with access to the tools for the successful integration of technology into today's classroom. The CIT originated in 1984 as the teaching lab for the Master of Arts in Educational Technology (MAT) program. Today, it has expanded to host

university wide faculty, staff and student training, and support many special projects, including the establishment of the University's first wireless smart classroom, access to state-of-the-art multimedia technologies, and a teaching and learning facility that supports the University's initiatives to integrate technology into the curriculum. CIT staff offer demonstrations and workshops on the latest technology solutions for higher education by maintaining a highly active training schedule on enterprise, desktop productivity, web-based, graphics and design, and multimedia applications.

Computer Labs: Students are given a wide variety of opportunities to learn about and use computers at USF (<http://www.usfca.edu/its/labs/>). A number of microcomputer labs provide students' access to both Macintosh and Windows computers. These computers allow students to use a variety of software applications including word processing, database and spreadsheet programs from a number of major software publishers. The computer labs are also part of a University-wide network for which connections are available in every residence hall room.

Library

The Gleeson Library/Geschke Learning Resource Center (the latter dedicated in 1997) houses more than 1,000,000 books, including access to more than 300,000 e-books. Over 260 research databases are available in all subject areas, with access to more than 60,000 electronic full-text journal, magazine, and newspaper titles (<http://www.usfca.edu/library/nursingvideo/> <http://www.usfca.edu/library/nursingassessment/>). Students and faculty in the SONHP also have access to multiple interlibrary loan services, including Docline, the National Library of Medicine's interlibrary loan and document delivery service, and Link+, a union catalog of more than 50 libraries in California and Nevada.

Students currently have access to almost 24,000 DVDs, videos and CDs, including 12,700 streaming videos from eight different collections, six of which are either specific to the nursing and the health sciences, or contain nursing and health sciences related content. The library provides access to, and training on the use of, several nursing and health science specific databases and resources, including CINAHL Complete, PubMed, Cochrane Library, Joanna Briggs Institute EBP Database, DynaMed, Scopus, and PsycInfo. Furthermore, the multidisciplinary nature of nursing research is supported by the diverse database subscriptions and web scale discovery system, provided by Ebsco Discovery Service, which allows users to search, in one place, the majority of the library's books and databases.

General library resources include:

- "Ask a Librarian" - a 24/7 service that provides direct access to a librarian through email and IM.
- "Mobile Research" provides access through EBSCOhost Mobile which allows students access to search USF's EBSCOhost databases with a simplified interface designed for smartphones and other mobile devices.
- An eBook collection provides a range of resources including both eBooks and research.

- General Education Research Guide
- Assessment Instruments Database

Librarians and staff in the Reference and Research Services Department assist with all aspects of research. The SONHP liaison (Ms. Claire Sharifi, MLIS) is, in partnership with nursing faculty, creating an information literacy instruction plan for the baccalaureate, graduate, and doctoral nursing programs that utilizes both asynchronous and face-to-face instruction. Information literacy instruction sessions occur at regular, key points throughout the programs. Research guides on the library website support self-directed instruction on resources. There are currently research guides on evidence based nursing, epidemiology, locating systematic reviews and meta-analysis, environmental health, and public health. There are also a number of research instruction videos created by the library liaison specifically for the students and faculty in the SONHP. The library liaison is a valuable resource for faculty and students across all programs.

Health Informatics is a rapidly evolving field. The primary source of information for this field is accessed through online resources. Many of these resources are open access, which means that they may be freely accessed on the internet. Gleeson library has access to a broad range of current journal literature in healthcare, medicine, and specifically in biomedical informatics. Faculty and students have found this resource to be adequate for classroom and research needs.

X. Facilities

Physical Facilities http://www.usfca.edu/online/gen_info/tour.html

The University of San Francisco is a 55-acre campus located near Golden Gate Park in the western addition neighborhood of the city of San Francisco. The 20 main campus facilities house administration, classrooms and offices, administrative and support services for the University community. It has four distributed campuses located in Sacramento, Orange County, Pleasanton, and San Jose. The SONHP currently occupies three floors of Cowell Hall on the USF San Francisco Hilltop Campus. Although space remains a premium, as at most urban campuses, the SONHP has been able to acquire the resources required to offer top quality programs. All full-time faculty have dedicated office space and part-time faculty share offices in order to have a place to meet with students. All full-time faculty have their choice of a laptop or desktop computer. The university participates in a three-year replacement program that upgrades the computers and related software. Annually each Department Chair is allocated a small discretionary amount of money to be utilized as deemed by the department for programmatic expenses.

The SONHP conference room (Cowell 212) is used primarily for scheduled faculty, student, and administrative meetings and can accommodate approximately 40 people. The Dean's Conference room in the SONHP Administrative Suite is booked for faculty and staff meetings and can accommodate 10-12 participants. SONHP faculty and staff also have access, on a "space available" basis, to the conference rooms in University Center, and the auditorium and

conference rooms at Lone Mountain and McLaren Center. There is an informal meeting area for students at the entrance of the Cowell Hall.

As part of their preparation for taking online courses, students complete the Online Orientation Course and an online orientation to the library. This tutorial features developing basic library literacy as outlined by the Association of College and Research Libraries (ACRL) [a division of the American Library Association (ALA)] Information Literacy Competency Standards for Higher Education and conforms to the Guidelines for Distance Learning Library Services. In addition the University of San Francisco provides faculty free access to Lynda.com, a web-based technology training service that includes hundreds of tutorials. Faculty can enroll in certificate tracks in “Online Teaching and Learning” and “Design and Media” and have access to a “Faculty Technology Reference Guide” at www.usfca.edu/its/learning Finally, program directors, the Online Programs Administrator and Pearson Embanet instructional designers provide support for faculty to launch and sustain each online program.

The Learning Writing Center not only provides support for on-ground students through student academic needs with tutoring, review sessions, one-on-one writing reviews, and online support modules. They also provide services to online students, offering writing assistance over the telephone or on Skype, extending these services to students from the branch campuses or those who cannot make it into the LWC during office hours.

XI. Conclusions

The program has been extremely strong in bridging the gap between healthcare professionals and technology professionals. The program brings together students of both backgrounds and immediately teaches and trains them to work in interdisciplinary teams on informatics problems.

As a graduate program in a fast-moving and relatively new field, it is imperative that faculty remain fully connected with current research and applications in industry. The level of technical and niche expertise necessary among faculty for the current degree program curriculum pattern has made the adjunct faculty recruitment and continuity extremely challenging. This has led, in part, to the high turnover in the program faculty. The high adjunct faculty turnover is also a result of the extremely rapidly changing field in relation to the necessity of more stability of a degree program.

Through this self-study it has also become more clear that the continuous admission cycle of Fall & Spring results in the bifurcation of resources across recruitment and admissions, program staff, and faculty. The analysis also points to the reality that the program is trying to be something for everyone in order to address the decline in admissions targets. The curriculum design has created two specialty pathways (analytical/technical & clinical) within a small program, as well as both a fulltime and parttime tracks. This has also resulted in further resource bifurcation of an already lean program.

XII. Comprehensive Plan For The Future

In summary, the positive experiences of our students and successes of our graduates is evident. Therefore, the program sees great opportunity for change and growth since The program made an informed decision and, based on a recommendation by the dean to the provost, a “pause” on enrollment for Fall 2020 and Spring 2021 was approved in order to implement a strategic curricular redesign for the following reasons:

- address enrollment target shortfalls
- to address how to program can better meet the changing needs of the field
- to better prepare incoming students for the current professional landscape
- to increase partnerships with both healthcare and technology companies so as to bolster the student to graduate pipeline.
- to improve market competitiveness and visibility of the program

The focus of the redesign will be to preserve and update the program while maintaining mission alignment, the evident contribution to the healthcare market, growth revenue potential for SONHP, and the lean program overhead design.

The needs assessment launched in August of 2020 and includes internal and external stakeholder consultation and competitor analysis. Under the leadership of Freddie Seba, Program Director (appointed August 2020), the findings will be synthesized and crafted into a SWOT analysis that will inform a 12-point strategic plan to include rebranding, revised recruitment models and scenarios that leverage partnerships, and curriculum pattern redesign to more effectively address the digital health needs in healthcare and related health industry, and improved research alignment with faculty expertise.