

Program Review and Assessment Report Indiana University School of Informatics and Computing, IUPUI 2018–2019

The following degree programs are reviewed in the 2018–2019 academic year:

- Health Information Management BS
- Media Arts and Science BS
- Bioinformatics MS
- Master of Library & Information Science

Schedule

	2015– 2016	2016– 2017	2017– 2018	2018– 2019	2019– 2020	2020– 2021	2021– 2022
Health Information Management BS	✓			✓			✓
Informatics BS			✓			✓	
Media Arts and Science BS	✓			✓			✓
Bioinformatics MS	✓			✓			✓
Health Informatics MS		✓			✓		
Human–Computer Interaction MS		✓			✓		
Applied Data Science MS			✓			✓	
Master of Library & Information Science		✓		✓			✓
Media Arts and Science MS		✓			✓		

**Master of Science in Bioinformatics
Program Review and Assessment Report 2018–2019**

1. Program Summary

The massive biological data, such as data generated from the human genome project and electronic health records, has led to the great need of computational techniques and machine learning over the big data. The field of bioinformatics emerges when computing meets information. Simply speaking, bioinformatics is an interdisciplinary field among biology, computer science, and information technology that develops algorithms, software tools, and data repositories for aggregating, storing, curating, analyzing, and visualizing biological data. Bioinformatics has significantly contributed to the cures for human diseases, improvements of crop quality and production, creation of new technologies, and novel applications to medicine and industries. With the high throughput data generation in biological science, the need for bioinformaticians is on the rise. Hence, it is necessary to train the next generation of bioinformatics professionals with the required skills to prepare them as future successful bioinformaticians.

Bioinformatics programs have been offered at different levels in the US, from BS to MS and to PhD programs. Due to its multidisciplinary nature, it is important that the bioinformatics curriculum benefits both the computer scientists and the biologists. Many approaches and strategies for bioinformatics education have been proposed in various bioinformatics programs. Especially, there is great advocacy for conveying the computational and information technology skills for biologists to meet the challenges for the big data sciences. The biomedical data analytics, especially for the -omics era, is another challenging area. In addition, the program competencies have been discussed among researchers and educators. For example, some previous work concluded that the five broad competency areas required for bioinformaticians are biology, computer science, statistics, ethics, and core bioinformatics.

Bioinformatics is a cutting-edge graduate program in the School of Informatics and Computing (SoIC) at IUPUI, which is the first school of its kind in the US, focused on innovative research in fast-paced and dynamic informatics fields. The bioinformatics program is a relatively new interdisciplinary field and focuses on translational research that uses computational approaches to transform biological data into scientific discoveries that help us better understand the life science and improve patient care. No national ranking for such a program exists because of its degree of specialization.

2. Program Processes

2.1 Program contents and challenges

Extensive efforts have been taken by the Bioinformatics Program for improvement of the program. The emerging trend of large-scale biological data has restrained the traditional biologists from using the information and has led to the needs of programming and computer software for data analytics, which led to the ‘data-driven science.’ At the same time, the Bioinformatics Program has to adapt to meet these new needs. In addition, as an emerging interdisciplinary field, the Bioinformatics Program is facing new challenges for curriculum design, course organizations, and training delivery approaches.

The program challenges also affect the trainees ultimately. For example, it is natural for some trainees to wonder whether they have been provided the best practical training in bioinformatics so that they are career-ready upon completion of their degree programs. The Bioinformatics Program is expected to have trainees from different life science and computer science backgrounds, as the bioinformatics is the bridge between life science and computer science. The program is expected to deliver intensive training in both biology and computing skills to provide the workforce with individuals with an interdisciplinary set of skills necessary for bioinformatics projects.

Students with strong computer science background are expected to have the capability to create and modify bioinformatics software systems and/or applications to address questions in bioinformatics research. Students with life science backgrounds are expected to have applied knowledge on how to operate existing bioinformatics tools and to apply the tools for specific bioinformatics projects. Their strong life science background facilitates them in the interpretation of biological experimental results.

In addition, it is necessary to include hands-on training on online data repositories, such as UniProt and GenBank, and bioinformatics tools, such as the Basic Local Alignment Sequence Tool (BLAST) for identifying sequence similarities in both DNA and protein sequences. It would be better for a single application to integrate multiple bioinformatics tools for training the students in bioinformatics.

It is a general perspective that the main areas of bioinformatics are genomics, transcriptomics, proteomics, and systems biology. Genomics includes sequencing, assembly, and analysis of DNA, transcriptomics studies gene regulation and RNA sequences, proteomics specifically deals with protein structures and functions, and systems biology involves computational data modelling of biological systems, which can be molecule, tissues, organs, or whole organism.

2.2 Program Competencies

Existing program courses and curriculum designs are based on these four major areas of bioinformatics: genomics, transcriptomics, proteomics, and systems biology. The major competencies of bioinformatics programs are listed below:

- biological database management,
- genomics data analysis,
- transcriptomics data analysis,
- proteomics data analysis,
- statistical methods in bioinformatics,
- algorithms,
- bioinformatics programming,
- systems biology,
- structural biology,
- next generation sequencing,
- third generation sequencing,
- data mining,
- text mining,

- big data analysis,
- computer modeling,
- machine learning,
- and other major skills.

2.3 Structure, breadth, and depth of the curriculum

This program is structured and has a need to be taken in a specific order for some advanced courses. It is set up so that the program is built as blocks to help ensure the student is given its foundation to move onto the next section.

The required core courses give the basic overview of the bioinformatics program and provide hands-on experiences for the various techniques and tools used in bioinformatics. The advance core courses prepare students to further specialize in a certain area and keep up with the ever-changing emerging areas in bioinformatics. The elective courses provide the student with a wider breath to learn of related fields and reinforce their knowledge in bioinformatics. Basically, the curriculum design ensures that, no matter what a student background is, the student can find courses in bioinformatics that suitable for their understanding of bioinformatics.

The Bioinformatics program is diverse so each class must meet a specific measure to ensure the student has a foundation on which to build.

2.4 Interdisciplinary program

Bioinformatics is an interdisciplinary program in the areas of computational biology, computer sciences, and information technology. This gives the students more areas of expertise to choose from. For example, for the biology-oriented students with limited background, the programming courses (Shell script, R, and Python) are taught in their first semester entering the programs. This makes sure they are ready to work on bioinformatics projects from the beginning. Students with strong computer science background have the opportunities to learn more on biological science and computational bioinformatics.

2.5 How has the program curriculum responded to new directions in the discipline

The curriculum has been adjusted to meet new directions since the program started and will continue to be adjusted because bioinformatics is an area that is continuously evolving. For example, over the past few years, single cell sequencing and nanopore sequencing have become the most active research area. Faculty in the bioinformatics program have continuously added these new topics to the core courses, such as INFO-B 519 Introduction to Bioinformatics and INFO-B 528 Computational Methods for Analyzing High-Throughput Biological Data. The program continues to adapt itself to the emergence of new technologies. Our curricula and syllabus are kept up-to-date to meet the market needs.

A curriculum committee has been formed in the department to go over the curricula and syllabi periodically, making sure they are updated.

3. Program Learning Outcomes

Principles of Graduate and Professional Learning (PGPL)

- | | |
|--|--------------------------|
| 1. Knowledge and skills mastery | <i>Major emphasis</i> |
| 2. Critical thinking and good judgment | <i>Moderate emphasis</i> |
| 3. Effective communication | <i>Some emphasis</i> |
| 4. Ethical behavior | |

Assessment methods

- A Assignments
 Q Quiz
 M Midterm quiz/exam
 E End-term quiz/exam
 F Final project
 P Presentation

The expected program learning outcomes are based on the major competencies and major bioinformatics areas. Upon completion of the graduate degree program, a student is expected to possess the following bioinformatics capabilities.

Learning outcomes	Course	RBT	PGPL	Assessment
1. Analyze biological data set with state-of-the-art computational tools and methods	INFO-B 519	3	1	AME
2. Design software pipelines for automatic analysis of big biological data and to find biological information from the data	INFO-B 519	4	1 2	AME
3. Identify and interpret large size health data with missing values	INFO-B 518	3	1,2	AQMFP
4. Infer and justify small size health data specific to diseases	INFO-B 518	3	1,2	AQMFP
5. Correlate massive phenotypic and genotypic data	INFO-B 518	3	1,2	AQMFP
6. Decide and model population, sampling and hypothesis testing for specific diseases	INFO-B 518	4	1,2	AQMFP
7. Design and formulate sampling and hypothesis testing for hospital data and Insurance data set to evaluate the complexities	INFO-B 518	4	1,2	AQMFP
8. Select and generate regression analysis and other statistical analysis for precision medicine applications	INFO-B 518	4,5	1,2,3	AQMFP
9. Outline and formulate paper presentation	INFO-B 518	4,5	1,2,3,4	P
10. Construct and rearrange project design, writing, analysis, and presentation	INFO-B 518	5,6	1,2,3,4	QMFP
11. Develop and revise programs to perform data analytics on large, complex datasets in R	INFO-B 518	4,5,6	1,2	AQMFP
12. Analyze and process microarray datasets and functionally interpret the results in light of molecular biology.	INFO-B 528	4	1, 2	AME

13. Analyze time course RNA and protein expression levels and model of expression data.	INFO-B 528	4	1	AME
14. Analyze genomes comparatively and functionally Predict operon structure Methods for function prediction Studying evolution of operon structure Apply the principles to metagenomic context	INFO-B 528	4	1	AME
15. Analyze environmental microbial genomic data, resources available for metagenomics, metatranscriptomics, operons and transcription units taxonomic mapping, microbial abundance, interactions, and pathways.	INFO-B 528	4	2	AME
16. Evaluate prediction algorithms and their applications in understanding regulatory systems biology (using representations of regulatory motifs).	INFO-B 528	5	2	AM
17. Analyze networks by applying a range of algorithms.	INFO-B 528	4	2	AME
18. Evaluate biological networks, by developing and applying computational approaches for analyzing regulatory, protein-protein, genetic, and chromosomal interaction mapping data.	INFO-B 528	5, 6	1	AME
19. Evaluate current approaches for determining the structure, dynamics, and evolution of biological networks.	INFO-B 528	5	4	AME
20. Understand basic concepts and theories in machine learning.	INFO-B 529	2	1	AME
21. Use machine learning algorithms and tools in biological data analysis.	INFO-B 529	3	1	AMEF
22. Understand the pros and cons of various machine learning algorithms in applications.	INFO-B 529	2	1	AME
23. Select correct machine learning tools and parameters in biological data analysis and to find valuable information from the data.	INFO-B 529	4	2	AMEF
24. Evaluate common problems in biomedical informatics, such as sequence alignment, genome arrangement, and peptide identification	INFO-B 536	5	1	AME
25. Analyze time and space complexity and other theoretical concepts used in algorithm analysis and complexity analysis	INFO-B 536	4	1	AME
26. Apply abstract data structures to solve problems in biomedical informatics	INFO-B 536	3	1, 2	AMEF
27. Compare the pros and cons of computational methods for a biomedical problem and choose appropriate methods	INFO-B 536	4, 5	1, 2	AMEF

28. Evaluate the similarity between new problems and existing problems and adapt computational methods designed for existing problems to new problems	INFO-B 536	5, 6	1, 2	AMEF
29. Design computational methods using a greedy, brute-force, divide-and-conquer, or dynamic programming approach	INFO-B 536	6	2	AF
30. Evaluate biomedical problems using example-based problem-solving skills and iterative refinement skills	INFO-B 536	5	2	AMEF
31. Design and perform experiments for evaluating computational methods and publicly present experimental results	INFO-B 536	3, 6	1, 2, 3	F
32. Be introduced to the basics of molecular biology and need of programming in biology.	INFO-B 573	4	2	AME
33. Learn basics of operating systems and running shell commands to perform routine tasks.	INFO-B 573	3	1	AME
34. Learn Python Basics and able to script for analyzing simple to complex biological data sets with advanced integrated aspect of unix and python.	INFO-B 573	4	1	AME
35. Learn R programming basics, analyze read, edit and write a file in R, perform statistical testing and generate graphics. Student will be able to write R scripts for analyzing biological data sets.	INFO-B 573	4	2	AME
36. Learn writing html code and developing code to connect databases with Python/PHP.	INFO-B 573	5	2	AME
37. Understand dealing with data and database management systems. Student will also learn different major public databases in biological domain.	INFO-B 573	4	2	AME
38. Learn various bioinformatics applications-command line and interface	INFO-B 573	5	1	AME
39. Write a report and give an oral presentation grounded in an appropriate review of the literature.	INFO-B 573	6	3	F P
40. Be introduced to the basics of molecular biology and need of programming in biology.	INFO-B 636	4	2	AME
41. Learn basics of operating systems and running shell commands to perform routine tasks.	INFO-B 636	3	1	AME
42. Learn Python Basics and able to script for analyzing simple to complex biological data sets with advanced integrated aspect of unix and python.	INFO-B 636	4	1	AME
43. Learn R programming basics, analyze read, edit and write a file in R, perform statistical testing and	INFO-B 636	4	2	AME

generate graphics. Student will be able to write R scripts for analyzing biological data sets.				
44. Learn writing html code and developing code to connect databases with Python/PHP.	INFO-B 636	5	2	AME
45. Understand dealing with data and database management systems. Student will also learn different major public databases in biological domain.	INFO-B 636	4	2	AME
46. Learn various bioinformatics applications- command line and interface	INFO-B 636	5	1	AME
47. Write a report and give an oral presentation grounded in an appropriate review of the literature.	INFO-B 636	6	3	FP

RBT: Revised Bloom's Taxonomy

4. Program Assessment

4.1 Direct measures

4.1.1 Methodology

To evaluate how well students are meeting the program's intended learning outcomes (LOs), we conducted quantitative analysis of student grades for all assignments from three core courses in the program. Anonymized student grades were collected from instructors for courses taught in fall 2018 and spring 2019. The grades were broken down by individual assignment, project, exam, or quiz. For example, if a course contained three assignments with 30 students enrolled, we collected the grade received by every enrolled student for each of the three assignments individually (i.e., a total of $30 \times 3 = 90$ assessment points). Grades were renormalized so that they range from 0 to 100 points to allow meaningful comparison between courses. We then asked course instructors to map each assignment to program-level LOs. A total of 328 assessments were collected using this method. The number of course enrollments represented in this sample is 41. Note that this number does not represent unique students, because students typically enroll in multiple courses simultaneously. The collected dataset covers 16 of the program's 47 learning outcomes.

4.1.2 Results

We computed grade distributions from the above data. These distributions represent instructor assessment of students' mastery of each program-level LO. The distributions are plotted as histograms in the following table, broken down by competency area then by course. The red line within the histogram plots represent an 80-point grade, the program's threshold for passing. We also include the percentage of students (shown to the right of the histogram) who are considered to have mastered the intended outcome, having achieved a passing grade (≥ 80 points). The percentile is color coded in green ($\geq 70\%$), orange ($\geq 50\%$), or red ($< 50\%$).

Analysis: Analysis of student grades reveal that 10 LOs show evidence of good student achievements, with over 70% of student obtaining a passing grade in exams, assignments, and/or projects. Additionally, 0 LOs demonstrate moderate success (with over 50% of students achieving a passing grade). Lastly, 2 LOs have low achievement levels (less than 50% of enrolled students obtaining a passing grade).

The two potentially problematic LOs that were identified are listed (and highlighted in **red** in the assessment table). Course assessments indicate that less than 50% of enrolled students had mastered these LOs:

1. **INFO-B 528-LO5**: Evaluate prediction algorithms and their applications in understanding regulatory systems biology (using representations of regulatory motifs).
2. **INFO-B 528-LO6**: Analyze networks by applying a range of algorithms.

		grade distribution	% student meeting learning outcome
INFO B528	LO1: Analyze and process microarray datasets and functionally interpret the results in light of molecular biology.		95.7%
	LO2: Analyze time course RNA and protein expression levels and model of expression data.		95.7%
	LO3: Analyze genomes comparatively and functionally.		95.7%
	LO4: Analyze environmental microbial genomic data, resources available for metagenomics, metatranscriptomics, operons and transcription units taxonomic mapping, microbial abundance, interactions, and pathways.		95.7%
	LO5: Evaluate prediction algorithms and their applications in understanding regulatory systems biology (using representations of regulatory motifs).		47.8%
	LO6: Analyze networks by applying a range of algorithms.		34.8%
	LO7: Evaluate biological networks, by developing and applying computational approaches for analyzing regulatory, protein-protein, genetic, and chromosomal interaction mapping data.		95.7%
	LO8: Evaluate current approaches for determining the structure, dynamics, and evolution of biological networks.		87.0%
INFO B536	LO1: Evaluate common problems in biomedical informatics.		100%
	LO2: Analyze time and space complexity and other theoretical concepts used in algorithm analysis and complexity analysis.		100%
	LO3: Apply abstract data structures to solve problems in biomedical informatics.		100%
	LO4: Compare the pros and cons of computational methods for a biomedical problem and choose appropriate methods.		100%
	LO5: Evaluate the similarity between new problems and existing problems and adapt computational methods designed for existing problems to new problems.		100%
	LO6: Design computational methods using a greedy, brute-force, divide-and-conquer, or dynamic programming approach.		100%
	LO7: Evaluate biomedical problems using example-based problem-solving skills and iterative refinement skills.		84.2%
	LO8: Design and perform experiments for evaluating computational methods and publically present experimental results.		100%

4.2 Program assessment with indirect measures

The various bioinformatics programs have been studied regarding their hosting departments and schools in the United States. One of the major resources is the websites of the corresponding Bioinformatics programs, including the program outcomes, students, faculty, and other information. The second source is the US bioinformatics education provided by the Bioinformatics Organization which lists the bioinformatics programs:

http://bioinformatics.org/wiki/Education_in_the_United_States

It arranges all the bioinformatics programs in the US, for each state and each university. There are total 68 Bioinformatics Programs listed from this web site, including BS, MS, and PhD degree programs and certificate programs.

Career for Bioinformatics students

Detailed examinations on the job market for bioinformaticians in the US have been performed in May 2019. The summary information below are from indeed.com, a major job postings portal site.

Job opportunities and requirements

The job market for bioinformatics students is promising. The bioinformatics graduates can work on various related fields with varying titles. Sample industrial job titles include data scientist, research associate, computational biologist, bioinformatics scientist, bioinformatics analyst, software engineer, senior software engineer, and others. There are also openings in academia as postdoctoral fellows, research scientist, research professor, and faculty positions (such as assistant professors for Ph.D. students in Bioinformatics). The top ranked job titles for bioinformatics job openings from Indeed.com are illustrated in Figure 1.

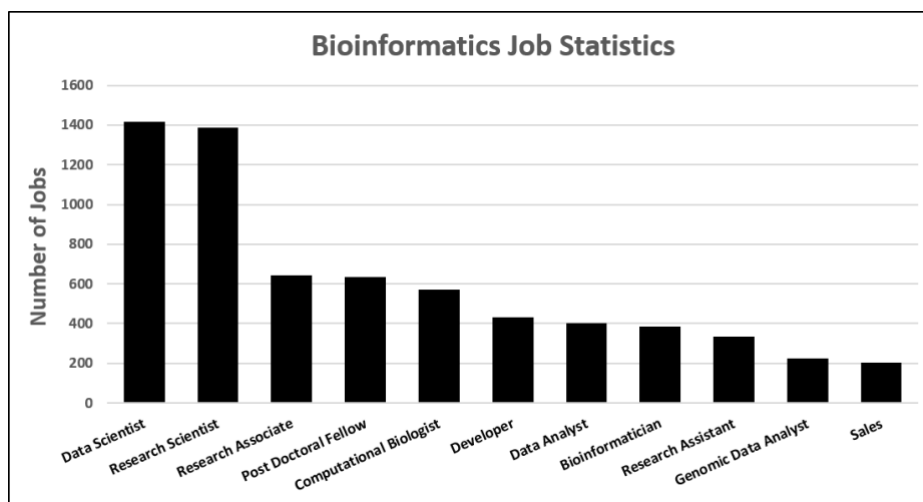


Figure 1. Main job titles for bioinformatics MS students

The salary package for bioinformaticians starts from \$20,000+ and goes up to more than \$120,000. With more experience in the field, one can go higher over the salary ladder. Based on more than 3,200 job postings in bioinformatics only from Indeed.com, the distributions of job opportunities and the salary ranges are illustrated in Figure 2. Bioinformatics job positions for the \$40,000–

\$60,000 salary range have the most openings (>700), which is the entry level jobs for bioinformaticians. The combined job postings for intermediate level in bioinformatics, salary range between \$60,000 and \$80,000, have about 700 job postings. The more advanced level jobs for bioinformaticians, with salaries between \$80,000 and \$100,000, have many opening (>600).

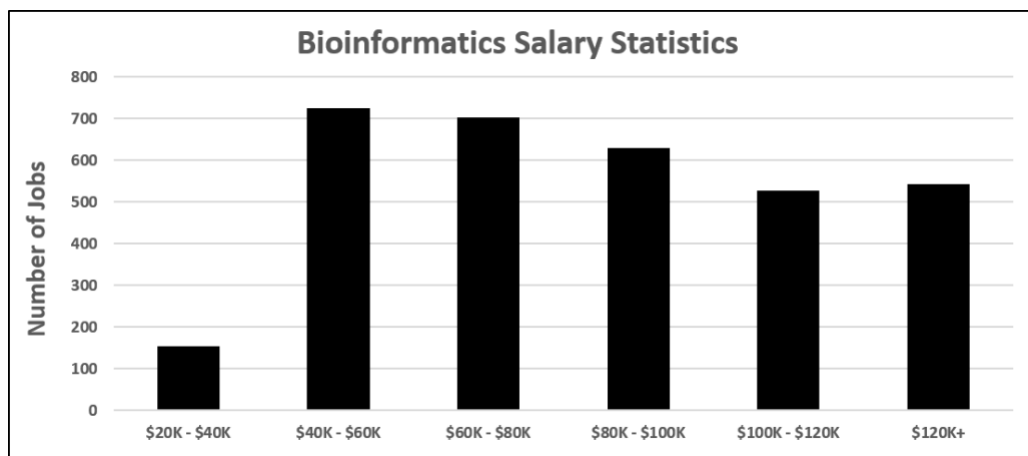


Figure 2. Salaries of bioinformatics jobs

The most advanced jobs, such as directors and managers, requires extensive experience in the fields, with salary more than \$100,000. However, the number of job postings lessen, with 528 postings in the \$100,000+ category and 543 postings in the \$120,000+ category. Thus, the majority of careers for bioinformatics graduates are in the entry, intermediate, and advanced levels, which are 95% of all the job postings.

Many job postings specifically state that a graduate degree in Bioinformatics or related fields are required, although there are opportunities for Bachelor's degree holders. In addition, job seekers with PhD degrees have more openings. Many job postings explicitly indicate that PhD degree is preferred over MS and BS degrees.

Regarding the working experiences, a minimum of 3 years working experience on average was required, even for most of the entry level jobs. The required years of experience vary according to the levels of jobs. Usually, a higher paid job requires more experience.

Skill requirements

Detailed analysis of the skill requirements for different job openings has also been performed. Since the focus on this work is to guide the education program, the skills requirements for the entry level jobs have been summarized below, which are interested in by most bioinformatics degree students. Similar analytical results can be performed on intermediate and advanced jobs. The required skills for randomly selected 50 entry levels jobs are illustrated in Figure 3 as Wordle image.

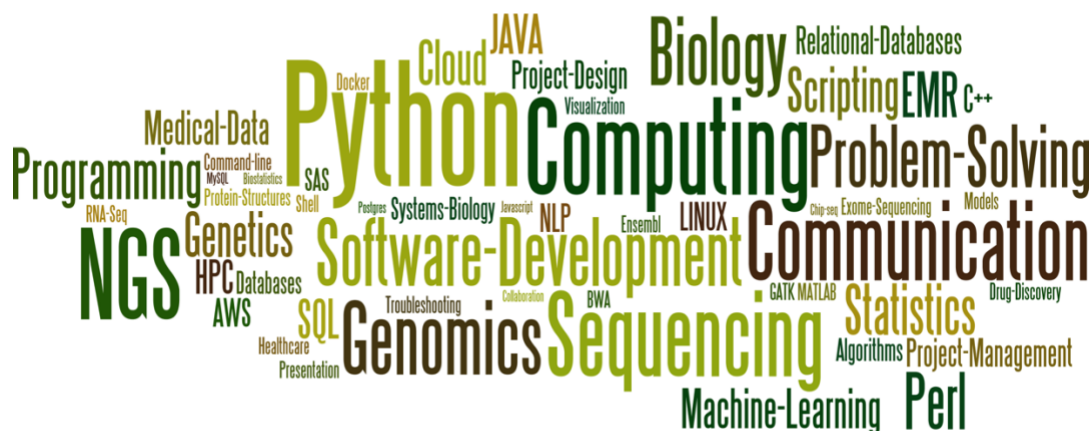


Figure 3. Main skills required for bioinformatics jobs

The Figure showed that the most required skills for bioinformatics jobs are programming skills, bioinformatics algorithms, data mining, statistical analysis, database managements, genomics, next generation sequencing, big data analytics, bioinformatics software tools, and others. More information of the required skills in bioinformatics is summarized below:

- Bioinformatics tools: Samples tools are sequence alignment tools, such as BWA, the Genome Analysis Toolkit (GATK).
- Statistical software systems: such as SAS. In addition, statistical analysis using R or Python is highly demanded.
- Programming skills: It was required for most bioinformatics jobs to be familiar with programming languages. Other than general programming, for bioinformatics, the most popular programming languages or script languages are Perl, Python, C++, and Matlab. At least one of these programming languages is listed in the job requirements.
- Biology knowledge: Knowledge from molecular biology, cancer biology, and/or modern biology is needed. This is the domain knowledge needed to understand and analyze the data, and interpret the analytical results.
- Genomics and genetics: Genomics and genetics are the core bioinformatics skill sets and are required for almost every bioinformatics job. For example, skills for high throughput sequencing technologies, next generation sequencing, and computational genomics are in high demands.
- Database management: Databases, including traditional relational database systems (e.g., SQL) and other big data databases (e.g., TCGA) are common required knowledge for potential bioinformatics job seekers. Especially, for big data management or analysis using cloud, such as AWS, it is a widely open field and is in great demands.

- Machine learning: for example, hierarchical clustering and decision trees are common required techniques.
- Some additional skills required for the jobs are good communication skills and presentation skills.

It can also be observed that there are some overlaps between the competencies and the skill requirements. In fact, the more overlap, the better, as it shows that our program competencies meet the job market for bioinformatics.

Employers for Bioinformaticians

Based on the job postings, the top 15 companies who have the most job postings in bioinformatics are summarized in Figure 4.

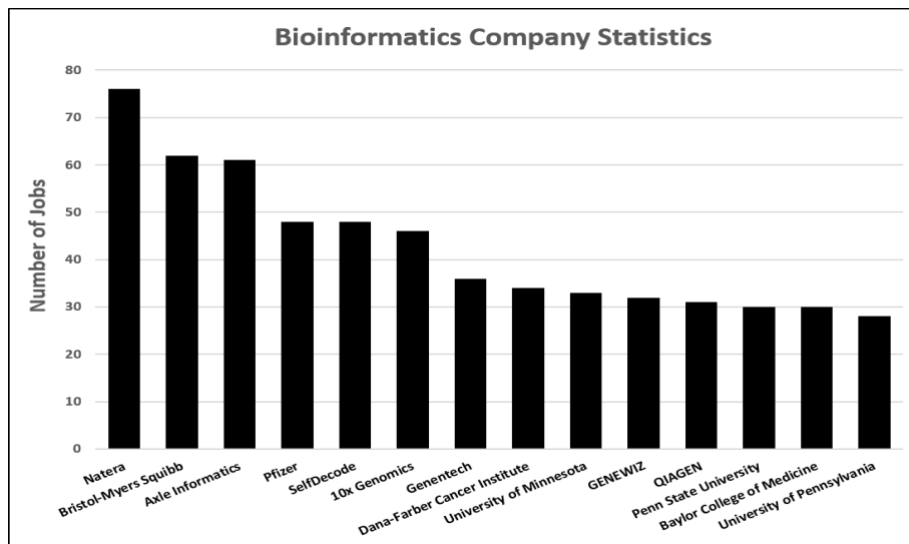


Figure 4. Top companies hiring bioinformatics student.

It can be observed that the leading employer is Natera, which is a leading gene testing company. It provides preconception and prenatal genetic testing services by using DNA sequencing. The second largest company is Bristol-Myers Squibb, which is a leading pharmaceutical company. Other top companies and institutes all on biomedical related research and development.

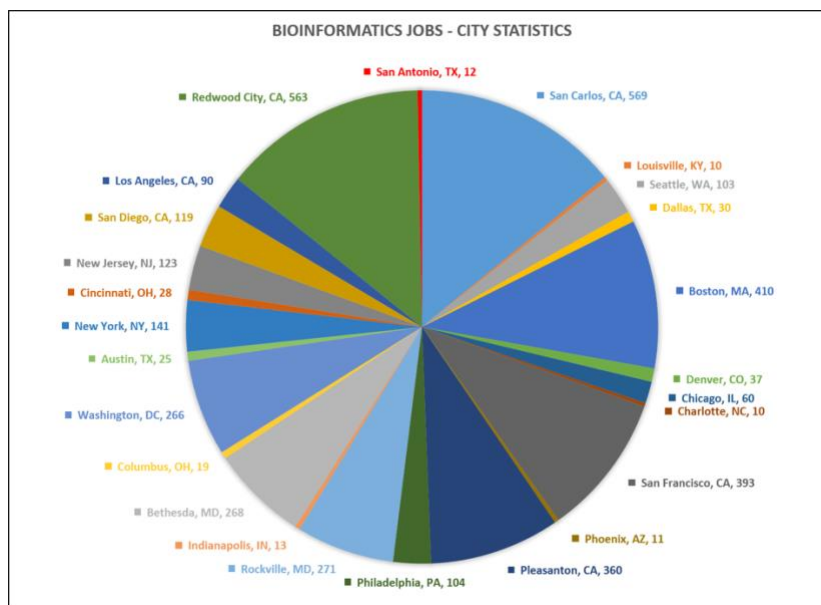


Figure 5. Main cities for bioinformatics jobs

Another way to investigate the bioinformatics job market is the locations of the job postings, which is summarized in Figure 5, for the top 25 locations who have the most job postings. The blue colored areas are on the west coast, mainly in California, which is about 50% for the top 25 locations. The East Coast including Boston Metropolitan areas, NIH campuses, Philadelphia, and New York also has more than 35% of the top locations. The middle areas of the US has only less than 10% of the job positions. The data show that most of these bioinformatics employers are in the west or east coasts.

In addition, if there is a big city with a large medical center, the employment opportunities in bioinformatics will rise, such as in Chicago or Houston. For relatively small cities, the job market for bioinformatics is limited. For example, in the city and the metropolitan areas of Indianapolis, IN, there is only 13 openings in bioinformatics, although there is the largest medical school in the US and a lot of biotechnology companies, besides the giant pharmaceutical company, Lilly, is right next to the city.

4.3 The MS bioinformatics employment data

The employment rate for MS in bioinformatics program at IUPUI is 84% after 6 months of graduation. For Bioinformatics MS graduates, the average salary was \$77,500, \$62,500, and \$65,000 for 2016, 2017, and 2018, respectively (Fig. 6). The common position title and the company names are listed below.

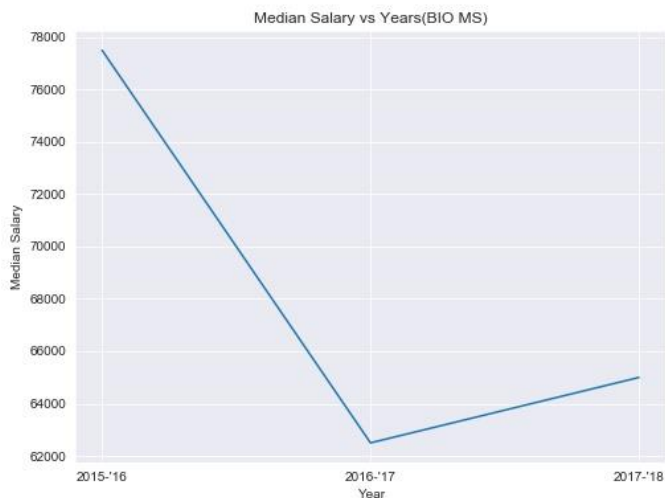


Figure 6. Average salary of Bioinformatics MS graduates

Position Titles for Bioinformatics MS Graduates for 2017:

- Bioinformatician
- Bioinformatics Analyst
- Bioinformatics Programmer
- Bioinformatics Specialist
- Bioinformatics Systems Analyst
- Computational Biologist
- Data Architect
- Informatics Assistant
- Research Data Analyst

Company Lists for Bioinformatics MS Graduates for 2017:

- Cincinnati Children's Hospital
- Hudson Alpha Institute for Biotechnology
- Human Longevity
- Indiana University School of Medicine
- The Jackson Laboratory
- Mayo Clinic
- NYU Langone Medical Center
- The Ohio State University Medical Center
- The University of Tennessee Health Science Center
- Vanderbilt University Medical Center
- Washington University of Medicine

Position Titles for Bioinformatics MS Graduates for 2018:

- Bioinformatician

- Bioinformatics Engineer
- Bioinformatics Analyst
- Computational Biologist
- Data Analyst
- Research Associate

Company Lists for Bioinformatics MS Graduates for 2018:

- Anzeta
- Covance
- Indiana University School of Medicine
- Kothiyu
- Mount Sinai Health System
- UT Southwestern Medical Center
- Washington University

Position Titles for Bioinformatics MS Graduates for 2019:

- Bioinformatician
- Bioinformatics Engineer
- Bioinformatics Analyst
- Computational Biologist
- Data Analyst
- Research Associate

Company List for Bioinformatics MS Graduates for 2019:

- Eli Lilly
- Mayo Clinic
- Jackson Laboratory
- Human Longevity
- Practice Fusion
- Anzeta Inc.
- MacroGen Corporation
- Covance
- 11evens, LLC

4.4 Teaching Assessment

As bioinformatics is a practical subject, the teaching methods are a combination of lectures, problem-solving exercises, laboratory sessions, seminars and workshops, small group course projects, theses, internships, and independent studies.

How do we measure each of the desired behaviors listed as assessment methods?

- The assignments, quizzes, and exams are graded, and the scores are the measures.

- The projects are measured by the professors on the quality of the written reports, posters, and peer-reviewed publications.
- The thesis is evaluated by the thesis committee based on the quality of the thesis work, including the written report and the oral defense.
- The practical exercises, the internships, and the lab sessions are evaluated by the practical solutions, the skills the students demonstrated, and the student career opportunities.
- Retention and graduation rates are tracked and studied

4.5 Enrollment Assessment

The Enrollment of the MS program in Bioinformatics students has been assessed with three metrics:

- **The total number of MS students in the Bioinformatics program:** the last 6 years of MS students in the program has been illustrated in Figure 7, which shows the number of students was stable in general.

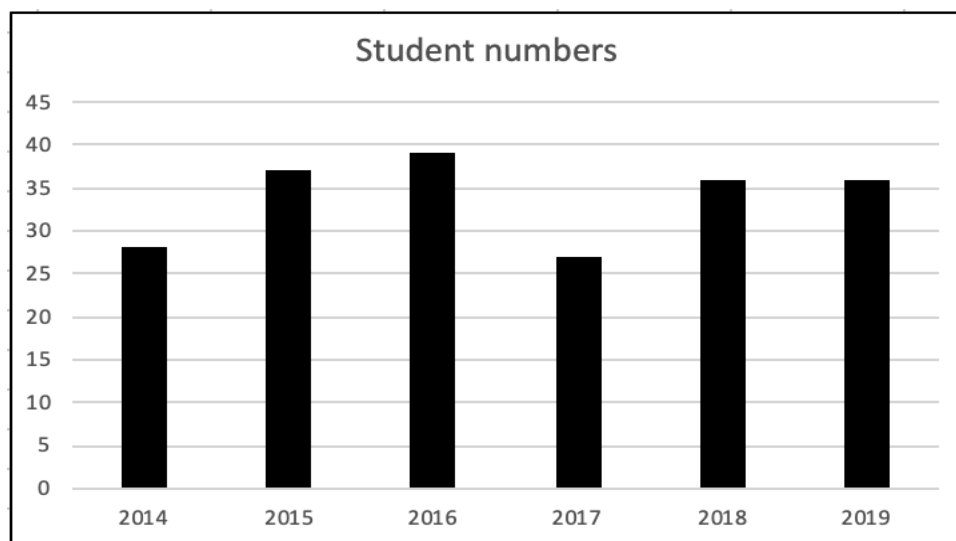


Figure 7. Numbers of enrolled students in the past 6 years

- **The total headcount of Bioinformatics course enrollments:** For the last three years, the total headcounts of students enrolled in the Bioinformatics graduate courses are illustrated in Figure 8. The student headcount for the bioinformatics courses in the fall semester increased in the last three years.

The headcount increased by 9% from fall 2016 to fall 2017 and by 13% from fall 2017 to fall 2018.

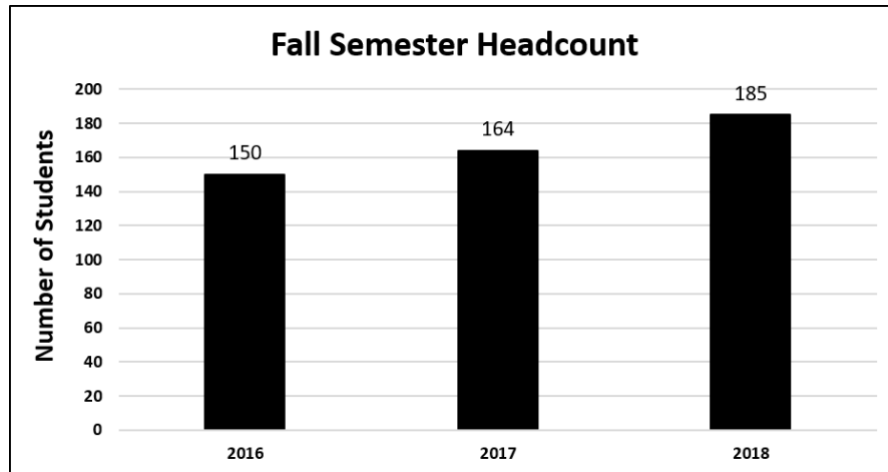


Figure 8. Fall semester class registration headcounts in the last 3 years

- **The total credit hours of the Bioinformatics course enrollments:** for the last three years, the total credit hours of students enrolled in the Bioinformatics courses in the fall semester are illustrated in Figure 9. The same pattern as the headcount is observed that more credit hours have been taken by students for the bioinformatics courses.

The credit hours increased by 11% from fall 2016 to fall 2017 and increased by 9% from fall 2017 to fall 2018.

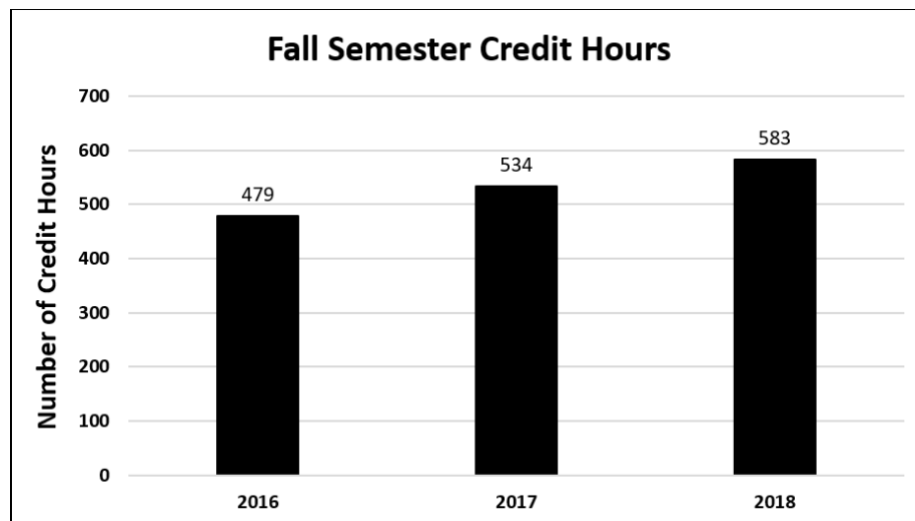


Figure 9. Fall semester credit hours of the Bioinformatics MS program in the last 3 years.

Combining the three metrics of the enrollment assessment, the MS in Bioinformatics program has been healthy for the last few years with increase in the program student number, the course enrollment headcount and the credit hour.

5. Improvements of the Bioinformatics Program

The information learned from this study provides great guidance for the redesign of the curriculum, help for the students to self-evaluate their potential bioinformatics skills, and promotion of hands-on experience for bioinformatics professors, educators, and students.

The bioinformatics program at IUPUI offers both MS and PhD degrees. Based on the survey results, the curriculums have been revisited and the competencies have been examined. The information from this project help the bioinformatics programs in the following matters:

- Eliminate redundant contents: By examining the program competencies and the individual course outcomes, the redundant contents across courses have been identified and resolved.
- Develop new course modules: to cover all the required skills, modular courses of 1 or 2- credits have been designed to cover specifically of one or two required skills. This guarantees that our students are career ready upon graduation. For example, for the biology-oriented students with limited background, the programming courses (Python, Shell scripts, and SQL) are taught in their first semester entering the programs. This makes sure they are ready to work on bioinformatics projects from the beginning.
- Reorganize the course offering schedule: The course offering schedule has been revisited to make sure that the students meet all the prerequisites when they are ready to learn a new skill.

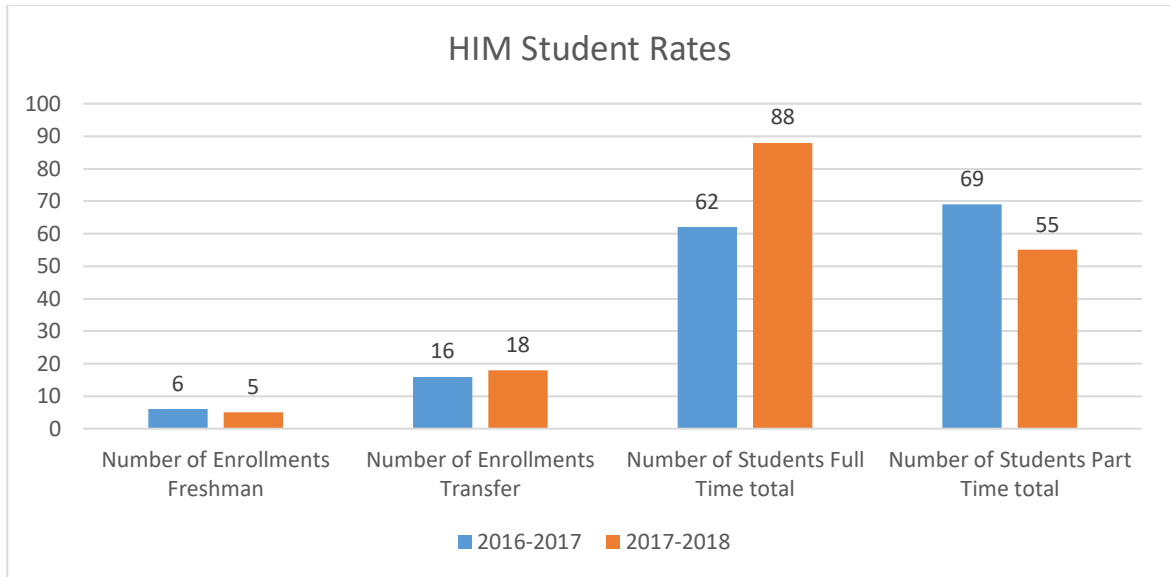
In addition, all the students in our bioinformatics program are provided the opportunities to have hands-on experiences, starting from the beginning of their MS programs. All full-time MS students are provided with partial scholarships and hourly research assistantship. All the PhD students are fully supported. With acceptance of the scholarships, the students are expected to work on bioinformatics projects upon entering the programs. The student records showed that this is a great way to increase the students' experiences and to improve the portfolios of the students when they are ready for jobs. The employment record shows that our students are more than 84% employed after six months of their graduation.

Bachelor of Science in Health Information Management Program Review and Assessment Report 2016–2018

I. Purposes, Reputation, Aspirations

1. Reputation

The Bachelor of Science in Health Information Management (HIM) in the Indiana University School of Informatics and Computing, Indianapolis, is one of the strongest and most stable HIM programs in the country. This program has been in existence for close to 70 years. There is not a national ranking for such programs due to the specialty secondary accrediting body. The Commission on Accreditation of Health Informatics and Information Management (CAHIIM) holds Indiana University as one of the original schools throughout the United States. IU has graduated to date well over 1,100 students, including 35 students in 2019. Because Indiana University no longer counts pre-HIM students, there has been a decrease in enrollment since 2015. Credit hours and class headcounts have increased, but the students do not count as HIM until they meet the requirements and have declared their major in Health Information Management.



The diverse backgrounds of the Health Information Management faculty prepare students for both traditional and nontraditional careers. In 2016–2017, 13 students claimed second country citizenship. In 2017–2018, 16 students were in this category. This program is offered online or on-campus, and students are asked to formally choose between the two types. With the Health Information Management profession evolving rapidly, the faculty have the support to travel to conferences and symposia to gather new and innovative ways to deliver education and to update their knowledge for the students.

The pass rates on the Registered Health Information Administrative (RHIA) exam for students in the Health Information Management program has been increasing over the past few years. The set goal was 90%. In 2016, the pass rate fell to 48% because all

students were now required to take the exam prior to graduation whereas in prior years when the pass rate was 100% only those who felt ready took the exam. By 2017, there was a significant increase to 63%. In the coming years, it is our goal to have an exam pass rate of at least 80% even though the standard nationally is only 75.8%. We expect within the next three years we will be back to 100%. When students came to the faculty regarding their concerns, we would ask them if they were using the resources. They would say no. In fall 2018, the program adopted Kaltura to measure whether the students viewed the lectures, and Examiity to determine whether students refrained from using resources during a closed book exam. After using Examiity on a trial basis, we discovered that some students were not doing all of their readings and were using resources during testing after we saw a reduction in scores from the midterm to the final exam. Although students may walk away from their computers for many reasons, these results gave us a starting point. They were doing minimal studying for their credentialing exam even in their HIM-M 490 Exam Prep course. Examiity and the Lockdown Browser prohibit the students from using their books, outside websites, and notes. If they want to succeed in the course, they will need to study the information that is presented in the lectures and readings. Students did make it very clear that they were overwhelmed with preparing for their exam with multiple different resources. We decided students would begin using one resource to help the students focus and would meet with the Instructor in the Exam Prep course one on one so that the instructor could quiz and tutor them bi-weekly. This would mean they would minimally have a specific amount of study time.

It is the aspiration of the program director and faculty to keep building a strong and diverse program. The program would like to:

- enroll students from smaller schools and community colleges to further their education and either do their final two years to finish a bachelor's degree or to enroll in the accelerated BS/MS program to complete their bachelor and master degree in only three more years.
- enable those students who transfer from a local community college to finish HIM courses within one year of transfer.
- increase the enrollment of international students, both traditional and nontraditional.

II. Program Processes

1. Program Content

The faculty has been working to meet the Health Information Management content set forth by the Commission on Accreditation Health Informatics and Information Management (CAHIIM). The program will go through accreditation in 2020–2021. With the adjusted content, there is an increased emphasis on databases, SQL, statistics and data mining, information governance, and informatics skills. The emphasis on policy, procedure, law, information governance, ICD-10, and management continues. With the former titles becoming more prominent, this program has made alliances with the Fairbanks School of Public Health, and the students now have a stronger, more HIM-

focused statistics course, Biostatistics for HIM, that is from Public Health. We hope in time there can be more courses that have CAHIIM components in them from Public Health since they share with us many of the same objectives. There has been an alliance inside the Department of BioHealth Informatics that better prepares students for an MS in Health Informatics and enables top students (GPA: 3.25+) to pursue and accelerated BS/MS. This alliance has changed the HIM program structure, and because the MS program is less structured, forcing the students to think more outside of the box. It has been found that the students are expecting the information to be handed to them already built. If this is not the case, they do not function well and immediately are willing to complain rather than attempt to do the work. The HIM department is trying to teach more critical thinking skills and pull some of the structure to prepare them more for the MS program.

Critical Thinking will be an area that the HIM department is required to work on over the next three years to help the BS and BS/MS students further. While it is very important for the HIM field to be structured, it will be just as important to be able to cross into their new field and way of thinking to excel. Master programs are less structured, have higher expectations, but when completed allow the students to be eligible for more positions and higher average pay expectations. These students also can be eligible for a second credentialing exam.

a. Distinctive characteristics of the program

The Indiana University Health Information Management program has secured professional experience sites that are completed weekly to give students a full year's worth of professional experience before they enter the healthcare industry. Students have received extensive education in ICD-10-CM and PCS. This education will give them another area of specialty. To distinguish this program from its competitors, the HIM program has experienced instructors that have different areas of specialty such as research, statistics, database design, etc. This difference will give the students a more diverse classroom experience, which helps give them real-life situational experiences. The school also offers tutoring and other resources for assistance.

b. Structure, breadth, and depth of curriculum

This program is very structured and must be taken in a specific order. It is set up so that the program is built as blocks to help ensure the student is given a foundation to move onto the next section. The introductory class, HIM-M 108, gives the basic overview, but as the students' progress in the program it becomes much more specialized to ensure that the students can find what they are interested in pursuing when they are finished. The HIM program is very diverse, so each class has a specific measure to meet to make sure the students have the foundation experience that will help them in future classes. The HIM-M 108 Introduction course has an overview but by the end of the HIM 400-level courses, they have covered all of the different HIM domains such as Privacy, Data Analytics, Policy, Procedures, Law, HIPAA, Coding, Reimbursement, Insurance,

Electronic Health Records and many others. Many students find areas they are not happy with but, by the end, they have areas in which they excel. There is a newer flag system that has been implemented due to the problem with the students not paying attention to the lectures and responding to the instructors or advisors. The instructors are also now emailing the students directly about the tutoring hours online. Our IU HIM program does not allow for a grading on a curve and we have found that students tend to perform poorly on their exams. We determined that the students that were not watching their lectures or doing the readings would complain to faculty about struggling. The students would be asked if they watched the lectures and they would say no. To be able to make sure they are watching the recordings, it is now an assignment and it is placed in Kaltura that shows if they watched and that it was watched the whole way through. This change was implemented in 2018 and this has shown an increase in them understanding the content and being more prepared for the exams. Another issue that was found inside the program was that there are extensive assignments to demonstrate expertise for CAHIIM accreditation. Many HIM students are either working in the field, or get employed in the field while in school, adding to all of the reading, assignments, and lectures students find themselves.

Previously the HIM program had its own grading scale. In fall 2017, the program eliminated the A+. The curriculum is very intensive for the students, and there is not much room for electives or branching outside of the program. In recent years, the program director increased room for specialization in the curriculum in data analysis, clinical documentation improvement, and information governance. The knowledge starts with basic math and, when finished with the curriculum, the students are able to do statistical analysis. English is required, and when the students are finished, they have very strong writing skills in both business and healthcare. The students have strengths in both state and federal policies, grant writing, and six sigma. While the program commences with basic knowledge and skills, it makes the students academically strong enough to show their expertise on the national exam.

c. Interdisciplinary program (combining two or more into one-IT/HIM of Law/HIM) offerings

HIM has a strong interdisciplinary program in Information Technology and Health Information Management. Students can work in many healthcare settings, and they obtain certification(s) in Clinical Documentation Improvement, Privacy and Security, and Data Analytics. With the education that is provided in this program, they have the options to choose from IT auditing, securities and even assist with IT databases. There are also interdisciplinary options in the legal and health information management arena. These options permit the students to be in the risk management area and quality improvement areas, areas that allow them to assist legal teams. The HIM degree is considered a cross of business, health, and science. Graduates can choose to move into research if they want to explore science.

d. How has the department curriculum responded to new directions in the discipline?

The department curriculum is constantly evolving to meet the needs of our students, the HIM profession, accreditation bodies such as CAHIIM, and the health care industry. Our students are receiving training in SQL, Database Design, Electronic Health Records, Data Analytics, Project Management, Information Governance and many others. There continues to be a shift to electronic health records and HIM “outside the walls.” The field continues to make the adjustments needed, but students are still educated on the previous core content with the new systems so they can see the actual changes. There has been a shift in HIM in the past year with questions and predictions on where the future of HIM will be going. The area of HIM is comparable to IT: It is about predicting what is needing and trying to meet that need. The change in curriculum in 2017, which increased the number of competencies each student needed to meet to 102, made it very difficult for students to pass their courses, given their rigor. With the implementation of Examity and the new competencies that required more analytics, statistics, database education, it was found that the students were having a harder time showing the knowledge without having the resources to just looking it up. Students were not participating in the reading or studying, they would do the work and go to the next assignment. When time for the test, it was assumed they would use book and resources so they would not need to memorize material. The implementation of Kaltura for grading attendance is encouraging them to listen to the lectures. Kahoots study games have been implemented inside courses to help in the area of recall. The students are being held accountable for the knowledge by expecting 73% on all courses.

e. What is the philosophy that has driven the establishment of the core, elective, and minor (i.e., minors offered for students in other departments) curricula?

Students can choose to participate in the Medical Coding Certificate program. These students are required to take the American Health Information Management Association Certified Coding Associate exam in their final year. We have had a 100% pass rate for these students taking the exam since 2014.

A Health Information Management specialization was also created for Informatics BS students interested in taking additional classes. Students are not able to sit for the RHIA credentialing exam, because they do not take all of the required classes.

III. Outcomes

a. Evidence of student mastery of transferable skills (Principles of Undergraduate Learning and the Principles of Graduate & Professional Learning)

Students demonstrate mastery of their schooling by showing their experience from their Practicum at the end of their academic career by presenting the project information to their practicum site. For the past three years, students have presented these projects at the Senior Capstone Event as part of HIM-M 443 and 444 Professional Practice Experience I and II. The students are required to complete 240 hours in a practicum setting such as a hospital, physician office, pharmaceutical company, Indiana State Department of Health, system transformation, and consulting firms. The students display their knowledge that

they have received at their practicum site and through didactic learning. Community leaders also attend the event to meet the new graduates that will be entering the workforce. The students are proving their skills during the Capstone event and they have amazing projects. The feedback from the practicum sites has also been positive. The students are giving feedback that they feel their sites are not giving them the experiences that they feel they wanted. For example, some students were expecting to gain experience coding from their practicum site, but their site never provided it. Students sometimes feel that they are being used as a replacement employee.

The program has enrolled many new practicum sites to address these kinds of issues. We continue to rotate practicum sites to try to make sure that the students get many different experiences to support their future careers in HIM. The program has also set the goal of 10 new sites per year. Some sites may not be a good fit due to the changing nature of the field and the advanced education of the students. Sites will need to be evaluated on the list to decide if they continue to be a good fit for the school. If the site evaluation falls below 3.2 evaluation on two or more student evaluations, the site will be evaluated for its fit for the school regarding future use.

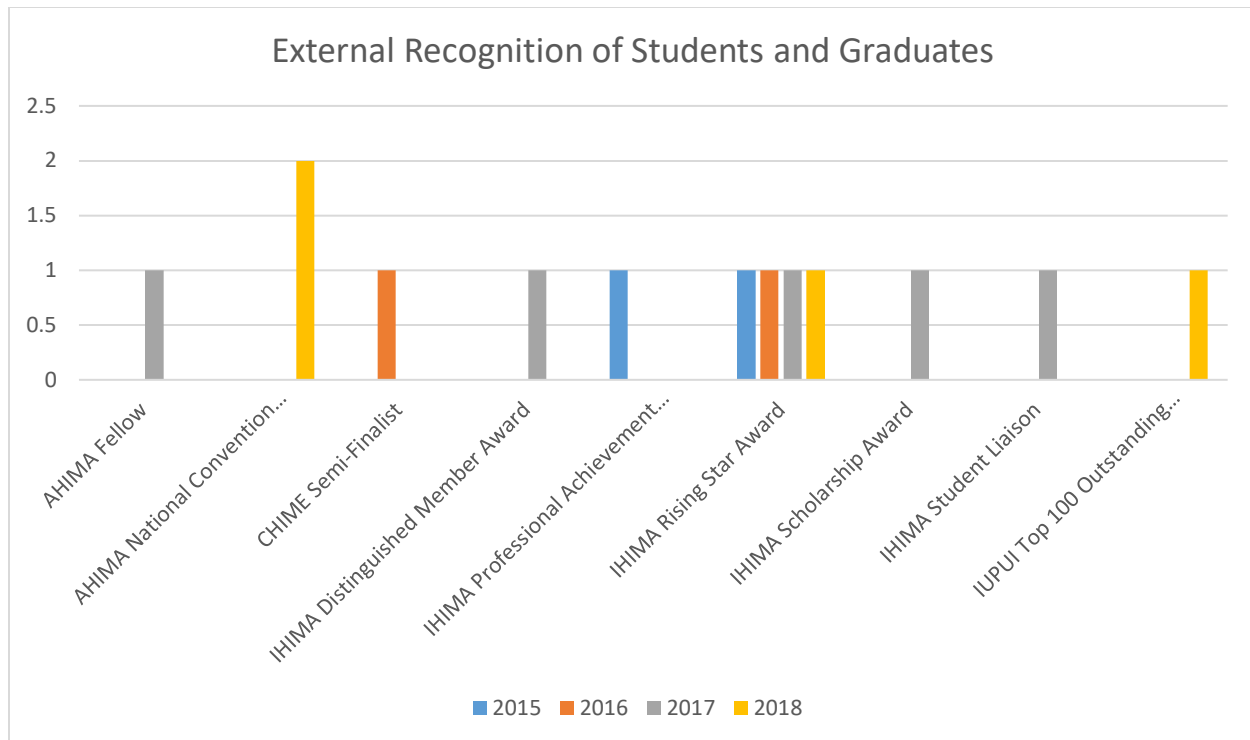
The HIM advisory board met to address the feedback from the students. For example, students were not happy with Examity. We discussed this with the advisory board and as a result, we have decided to keep Examity. We also discussed whether students should be required to take their RHIA Certification exam while they are still a student. We are requiring all students to sit for their exam. The students did not like Grammarly. The advisory board agreed that we should continue to use Grammarly because correct spelling and grammar usage is important in the workplace.

b. Evidence of student achievement of specified learning outcomes in the major

Currently the Principles of Undergraduate Learning are used inside the classes for specific projects or exams to assess their capabilities in the many different areas of expertise. There are also tests and projects that are evaluated on the Revised Bloom's Taxonomy levels for CAHIIM accreditation. Students use competency-based learning, all projects have rubrics attached, and students know what is expected. After they have shown the skill, then they move to recall of knowledge in examination. Students are introduced learning outcomes at a lower level in Bloom's and progress to higher levels in successive courses.

c. External recognition of students, faculty, or graduates including awards or honors and research award

The following table shows how many students received external recognition from 2015–2018.



Assessment

Students will pass the national Registered Health Information Administration (RHIA) examination with scores at or above the national average and be prepared for a full-time employment in the health information management field. The HIM program will continue to have a decreasing nonpassing (C– or below), withdraw, and drop (DFW) rate and an increasing retention rate, which both directly impact the number of students earning their BS in HIM degree within the state recommended timeframe of four years. These rates have been examined for every course. HIM Faculty complete IUPUI’s FLAGS (Fostering Learning, Achievement, and Graduation Success) early alert system to help those students who are not attending classes and/or not turning in assignments. Students are encouraged to reach out to their instructor, advisors, tutors, and the Writing Center to help them improve their work and prevent them from dropping or failing the class. Learning outcomes were redistributed among courses to even out the load so that some courses could avoid being bottlenecks to student progression through the program.

Teaching methods

Teaching methods include lecture, Kahoots, guest lectures, flipped classroom, kinesthetic learning, active learning, group work, project-based learning, discussions, and professional practicum experience. Curriculum analysis and revision is based on Commission on Accreditation of Health Informatics and Information Management Education (CAHIIM) accreditation standards and the Model Curriculum put in place by the American Health Information Management Association (AHIMA).

How could you measure each of the desired behaviors listed as assessment methods?

This is assessed by ongoing analysis of the RHIA exam scores, which is sent to the Program Director on a quarterly basis. Each semester, the program director and the faculty members review the course evaluations and make changes based upon the feedback. For example, new projects have been developed for the courses, such as Health Information Management, because many students were struggling with the course. Study guides have been implemented for the RHIA Exam Preparation courses. In 2017, we held a town hall meeting to hear student feedback. As a result, we changed the discussion date from Thursday to Friday to allow students more time to complete the assignments. We also changed the assignment due date from Sunday at 5 PM to Monday at 5 PM in response to student feedback. In addition, the program implemented more projects and the students only take midterm and final exams in each class.

The table below shows more detailed information.

Class	Course Revisions based upon Feedback or CAHIIM requirements
HIM-M 108 Introduction to HIM	Assignments were revised. Examity was used in the course.
HIM-M 110 Computer Concepts for Health Information	Assignments were revised. Examity was used in the course.
HIM-M 120 Data Organization and Presentation in Healthcare Environment	Assignments were revised. Examity was used in the course.
HIM-M 220 Healthcare Informatics and Decision Support	<ol style="list-style-type: none"> 1. Increased rigor in all courses ensuring academic excellence, HIM relevance, and critical thinking skills. 2. Increased the number of HIM-related case studies in all courses to ensure course content met CAHIIM competencies and to ensure students learn facts, concepts, and principles to think critically about the knowledge in a variety of increasingly complex ways. 3. Revise all course syllabi to align with CAHIIM competencies. 4. Incorporated Examity in my online courses and incorporated Respondus Monitor Lockdown browser in on-campus courses to prevent digital cheating during online tests and to ensure students learn and retain course content and ultimately increase RHIA Exam pass scores. Student feedback: Many students feel Examity is an invasion of their privacy, an inconvenience when scheduling exams, and a

	challenge when trying to understand proctors who are nonnative English speakers.
HIM-M 275 Effective Communication for the Healthcare Environment	Examity is used in this course. Assignments removed from HIM-M370 Health Information Management and placed in this course.
HIM-M 300 Database Design for HIM	Assignments were revised. Examity was used in the course.
HIM-M 325 Healthcare Information Requirements and Standards I	<ol style="list-style-type: none"> 1. Increased rigor in all courses ensuring academic excellence, relevance, and critical thinking skills. 2. Increased the number of HIM-related case studies in all courses to ensure course content met CAHIIM competencies and to ensure students learn facts, concepts and principles to effectively think critically about the knowledge in a variety of increasingly complex ways. 3. Revise all course syllabi to align with CAHIIM competencies. 4. Incorporated Examity in online sections and incorporated Respondus Monitor Lockdown browser in on-campus sections to prevent digital cheating during online tests and to ensure students learn and retain course content and increase RHIA Exam scores and pass rates. Student feedback: Many students feel Examity is an invasion of their privacy, an inconvenience when scheduling exams, and a challenge when trying to understand proctors who are nonnative English speakers.
HIM-M 350 Pathophysiology and Pharmacology for HIM I	Assignments were revised. Examity was used in the course.
HIM-M 327 Healthcare Information Requirements and Standards II	Assignments were revised. Examity was used in the course.
HIM M330 Medical Terminology	Assignments were revised. Examity was used in the course. We implemented the AHIMA Virtual lab in the course.
HIM-M 345 Healthcare Law, Ethics, and Information Release	More VLab exercises were used in the course. Examity was implemented.
HIM-M 351 Pathophysiology and Pharmacology for HIM II	Assignments were revised. Examity was used in the course.
HIM-M 355 ICD-10 CM/PCS Coding	Tutoring was offered for students that needed help. Lectures were provided.
HIM-M 358 CPT Coding	<ol style="list-style-type: none"> 1. Increased rigor to all courses ensuring academic excellence, relevance and critical thinking skills. 2. Increased the number of HIM-related case studies in all courses to ensure course content met CAHIIM competencies and to ensure students learn facts,

	<p>concepts, and principles to think critically about the knowledge in a variety of increasingly complex ways.</p> <ol style="list-style-type: none"> 3. Revise all course syllabi to align with IUPUI and CAHIIM competencies. 4. Incorporated MindTap in HIM-M 358 CPT Coding. What students liked most about the course: “The thing that I liked the most about the course was the materials that we used, especially MindTap. It helped to have the “Check my Work” option because you are able to put your initial guess in the blank and if it's wrong, then you are able to rework the coding scenario to see if another option is available. I feel like having that option, makes people more confident with learning how to code and by learning from the mistake, they are able to figure out the coding scenario.” 5. Incorporated flipped classroom in HIM-M 358 CPT Coding. What students liked most about the course: “Practicing coding in class with other students and the professor”. Incorporated Examity in my online courses and incorporated Respondus Monitor Lockdown browser in on-campus courses to prevent digital cheating during online tests and to ensure students learn and retain course content and ultimately increase RHIA Exam pass scores. Student feedback: Many students feel Examity is an invasion of their privacy, an inconvenience when scheduling exams, and a challenge when trying to understand proctors who are nonnative English speakers.
HIM-M 370 Health Information Management	<ol style="list-style-type: none"> 1. Student Feedback: Students did not like that assignments were due Sunday at 5 PM Response: The deadline is Monday at 5 PM. 2. Student Feedback: Student asked for a study guide Response: Students were not given a study guide, but Kahoots were implemented. 3. Student Feedback: Work on grading assignments Response: Revised rubrics to make them more clear. 4. Student feedback: Students do not like Grammarly. Response: Correct spelling and grammar is important so we have continued to use Grammarly 5. Student feedback: Some assignments were too long, not clear, etc.

	<p>Response: Assignments were revised. Some of the assignments have multiple learning outcomes that reduces the overall number of assignments.</p> <p>6. Student Feedback: For some assignments, the student did not do well or grasp the concept.</p> <p>Response: Assignments were revised to make them more clear.</p>
HIM-M 400 Research Methods and Analysis	<ol style="list-style-type: none"> 1. Student feedback: Students do not like Grammarly. Response: Correct spelling and grammar are important so we have continued to use Grammarly. 2. Student feedback: Some assignments were not clear. Response: Special attention is focused on the instructions and the rubrics. For the more complex assignments, a lecture video is included which helped the students grasp the concept better. 3. Student feedback: Students commented the research paper should be posted more in advance. Response: Students are given the project more towards the beginning of the class. For example, in Summer 1, the students have three weeks to complete the first draft of the paper.
HIM 420 Healthcare Planning and Informatics Systems	<ol style="list-style-type: none"> 1. Increased rigor to all courses ensuring academic excellence, relevance and critical thinking skills. 2. Increased the number of HIM-related case studies in all courses to ensure course content met CAHIIM competencies and to ensure students learn facts, concepts and principles to effectively think critically about the knowledge in a variety of increasingly complex ways. 3. Revise all course syllabi to align with IUPUI and CAHIIM competencies. 4. Incorporated Examity in my online courses and incorporated Respondus Monitor Lockdown browser in my on campus courses to prevent digital cheating during online tests and to ensure students learn and retain course content and ultimately increase RHIA Exam pass scores. Student feedback: Many students feel Examity is an invasion of their privacy, and inconvenience/burden to schedule exams and difficult to understand what the proctors are saying due to language barriers.
HIM-M 425 Quantitative Analysis of Health Information	<ol style="list-style-type: none"> 1. Increased rigor to all courses ensuring academic excellence, relevance and critical thinking skills. 2. Increased the number of HIM-related case studies in all courses to ensure course content met CAHIIM

	<p>competencies and to ensure students learn facts, concepts and principles to effectively think critically about the knowledge in a variety of increasingly complex ways.</p> <ol style="list-style-type: none"> 3. Revise all course syllabi to align with IUPUI and CAHIIM competencies. 4. Incorporated Examity in my online courses and incorporated Respondus Monitor Lockdown browser in my on campus courses to prevent digital cheating during online tests and to ensure students learn and retain course content and ultimately increase RHIA Exam pass scores. Student feedback: Many students feel Examity is an invasion of their privacy, and inconvenience/burden to schedule exams and difficult to understand what the proctors are saying due to language barriers.
HIM-M 443 Professional Practicum in Health Information Management I	<p>Students want more on hands-on experience and less repetitive tasks. The instructor has talked with the clinical sites about this. The HIM program implemented the Midterm and Final Evaluations to better assess student performance and learn about how things are going in the semester. Students and Clinical instructors want a list of projects and specific tasks that are expected during a professional practice experience site. Some clinical instructors did not provide timely feedback and those sites have not been used for future site visits</p>
HIM-M 444 Professional Practicum in Health Information Management II	<p>Students want more on hands-on experience and less repetitive tasks. The instructor has talked with the clinical sites about this. The HIM program implemented the Midterm and Final Evaluations to better assess student performance and learn about how things are going in the semester. Students and Clinical instructors want a list of projects and specific tasks that are expected during a professional practice experience site. Some clinical instructors did not provide timely feedback and those sites have not been used for future site visits</p>
HIM-M 457 Practicum in Medical Coding	<ol style="list-style-type: none"> 1. Increased rigor to all courses ensuring academic excellence, relevance and critical thinking skills. 2. Increased the number of HIM-related case studies in all courses to ensure course content met CAHIIM competencies and to ensure students learn facts, concepts and principles to effectively think critically

	<p>about the knowledge in a variety of increasingly complex ways.</p> <p>3. Revise all course syllabi to align with IUPUI and CAHIIM competencies. Developed a virtual Medical Coding Practicum using VLab patient cases and 3M Encoder in M457 Practicum in Medical Coding to meet the needs of a student with physical disabilities. What the student liked about the course: “As a practicum, it fit my schedule and access was very workable. It also provided me with an experience that I feel will be helpful once I begin working in the field.” Student feedback: The student felt like the evaluation of her was not appropriate. Response: Changes will be made to the evaluation form to make it more consistent.</p> <p>We have had a 100% pass rate for 2016–2019 for students taking the AHIMA Certified Coding Associate Exam</p>
HIM-M 462 Healthcare Quality Improvement	Assignments were revised. Examiy was used in the course.
HIM-M 470 Health Care Reimbursement Systems	<ol style="list-style-type: none"> 1. Increased rigor to all courses ensuring academic excellence, relevance and critical thinking skills. 2. Increased the number of HIM-related case studies in all courses to ensure course content met CAHIIM competencies and to ensure students learn facts, concepts and principles to effectively think critically about the knowledge in a variety of increasingly complex ways. 3. Revise all course syllabi to align with IUPUI and CAHIIM competencies. 4. Incorporated flipped classroom, incorporated guest speakers and 3M Encoder exercises relative to HIM-M 470 Healthcare Reimbursement Systems. What students like about the course: “The thing that I liked most about this course was the in–class activities that were used because it helped better understand the topic.” “I loved the format of the class. I liked how we reviewed the subject matter at the beginning and were given time to work on assignments afterward. This allowed us to ask questions.” “The Reviews and Guest Speakers” “The VLab assignments and Reviews.”
HIM-M 475 Health Information Technology	<ol style="list-style-type: none"> 1. Increased rigor to all courses ensuring academic excellence, relevance and critical thinking skills. 2. Increased the number of HIM-related case studies in all courses to ensure course content met CAHIIM

	<p>competencies and to ensure students learn facts, concepts, and principles to think critically about the knowledge in a variety of increasingly complex ways.</p> <p>3. Revise all course syllabi to align with IUPUI and CAHIIM competencies.</p>
HIM-M 490 RHIA Exam Preparation Class	<p>1. Student feedback: Students felt that the AHIMA VLab should not be used in this course. They felt it was not pertinent. Response: VLab discontinued in the class.</p> <p>2. Student feedback: Student feedback shows that they do not like taking the exam during the school year. Response: Research shows that students do better when they take it during the school year. Also, when the exam was not required, some students did not take the exam. We are requiring the students to sit for the exam prior to graduation.</p> <p>3. Student feedback: Students complained that there was a lot of work for a 1 credit hour class. Response: It is now a 3-credit hour class.</p> <p>4. Student feedback: Students wanted video lectures. Response: Lectures are provided.</p>

Our program also gathers evaluations from the Practicum Site Instructors and the students twice a semester. Students are now placed in a wide range of health information practicums, including software development, security consulting firms, student health centers, insurance settings, home healthcare, coding audit systems, physician offices, and specialty surgical facilities. This change allows the students to have greater depth in valuable real-world experience, which should translate into a wider pool of job opportunities upon graduation. During the clinical instructor visits, feedback is gathered from the students and the clinical instructor on how IUPUI can better prepare its students. One of the main suggestions is to give a list of tasks that the students need to complete. A handbook is being developed so that the students and the clinical instructors know the expectations in a more formal manner.

Assessment results

	Degrees Awarded	Certifications Awarded	RHIA Pass Rates	National Pass Rate	CAHIIM Accreditation	Employed	Average Salary RHIA	Average Salary Without RHIA
2012–2013	29	8	67%	76.0%	Yes	86.2%	\$39,000	
2013–2014	17	5	86.5%	76.5%	Yes	88.8%	\$42,000	
2014–	29	11	90.9%	75.8%	Yes	100%	\$45,000	\$35,900

2015								
2015–2016	35	17 ¹	65.7%	74%	Yes	100%	\$47,000	\$36,000
2016–2017	20 ²	11 ³	48%	70%	Yes	100%	\$51,500	\$35,000
2017–2018	38	15 ⁴	63%	72%	Yes	91.6%	\$38,625 ⁵	\$48,597
2018-2019	30	18	60%	71%	Yes	80%	\$42,939 ⁶	\$35,853

Projects for 2015–2016

The assessment projects include:

Assessment Project 1 – Increase the participation in RHIA exam to 100% to better evaluate how the curriculum is meeting secondary accrediting standards

Assessment Project 2 – Increase the enrollment of the BS/MS program to 40% of HIM students and evaluate the success of the students in the HI program year one

Assessment Project 3 – Develop the area of International Student enrollment by building more on grounds and distance education courses to meet all needs.

Please see the information below for more information about each of the assessment projects.

Assessment Project 1 – Increase the participation in RHIA exam to 100% to better evaluate how the curriculum is meeting secondary accrediting standards

Student Learning Outcomes:

In the past four years, pre-graduation participation on the RHIA exam has not been more than 34% percent. This needed to be increased to 100% in order to get good results on how the curriculum is meeting the needs of the students.

Assessment:

¹ 17 current students and 6 graduates with a total of 23 awarded

² 19 full-time students and 1 part-time student

³ 11 current student and 2 graduates with a total of 13 awarded

⁴ 15 current and 5 graduates with a total of 20 awarded

⁵ From the salary survey, we realized many students were not working in the field. They took lower paying jobs such as coder and a position in the government.

⁶ Part time not included in pay because the student had a master's; not all salaries have been reported. We are still gathering information.

The advisors grant permission for students to enroll in the final semester of their senior year. The faculty member will review the course roster, complete the RHIA application form, and have it signed by the HIM Program Director. The student sends in the form once they have completed the application form. There have been excellent pass rates previously, but the small percentage taking the exam makes this number questionable and needs to be evaluated. It is expected that we still surpass the national average pass rate of 70%. The areas on the exam that are broken down into subdomain and task levels that can be compared to the course syllabi and assignments. This comparison will show the weak areas of the curriculum. Those classes will then be revised to meet the needs of the exam and student better.

Teaching Methods:

Only students who are in the final semester of their senior year will be approved to register for HIM-M 490. Once they are enrolled in the course, the Program Director will sign the application form and the students will be responsible for sending it to the American Health Information Management Association (AHIMA). AHIMA will send the students an authorization to test letter so that they can schedule their exam time within a specified time frame. The instructor for the HIM-M 490 Exam Prep class will then work with the students with the text, lectures, study guides, and exams. It is expected that students should score 73% or better in three of five domains, minimum, or higher.

How could you measure each of the desired behaviors listed as assessment methods?

Measurements are already in place: AHIMA sends reports quarterly with student names, exam results, and school pass rates in comparison with the national average. There are breakdowns of the domain areas, and then the classes will be compared so that the weaker classes are diagnosed and addressed.

Outcome:

Fall 2016: 1 out of 1 students (100%) took the exam.

Spring 2017: 23 out of 23 students (100%) took the RHIA exam.

Fall 2017: 8 out of 10 students (80%) took the RHIA exam. This percentage was lower because the students were not required to take the exam as part of the course. They were strongly encouraged.

Spring 2018: 17 out of 20 students (85%) took the RHIA Exam. This percentage was lower because the students were not required to take the exam as part of the course. They were strongly encouraged.

Fall 2018: 4 out 4 students (100%) took the exam because it was required to sit for the exam for graduation and pass the class.

Spring 2019: 24 out of 24 (100%) students took the exam.

The overall total is 94% participation on the RHIA exam.

*We have made the exam window smaller (1 week). The course has been revised multiple times to include lectures, discussions, Kahoots, study guides, Zoom recordings. The course also uses Examity, which allows the students to be proctored with a web cam while taking the exam. Lockdown Browser is also used for those students enrolled in the on-grounds class.

**When comparing the students employed with the RHIA at graduation to those that did not pass, there is a median pay gap of minimum \$9,000 in the past two years. This gap shows the career benefit of the RHIA credential. This credential is what allows the student to be employable globally.

Careers

A. Job Placement

There is 91% placement for our graduates.

B. Salary

The mean salary from 7/1/16-6/30/17 was \$38,6000

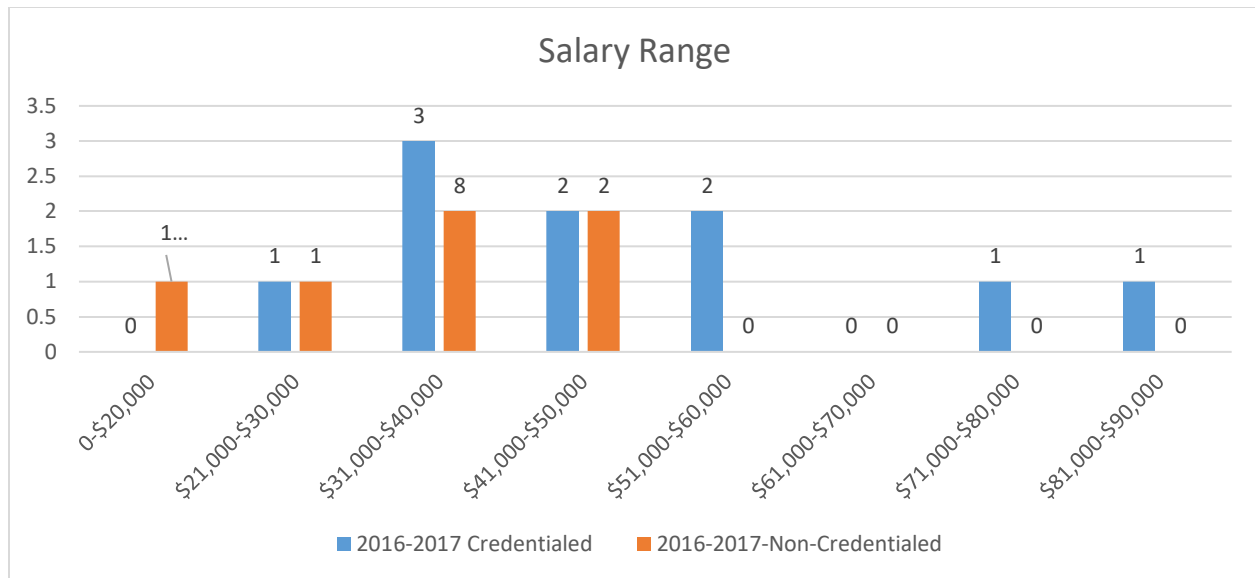
C. Positions

Our graduates hold positions in the following areas:

- Application Business Analyst
- Business Application Analyst
- Outpatient Review Coordinator
- Utilization Manager
- Coding Specialist
- Quality Assurance Systems Analyst
- Privacy Officer
- Release of Information Specialist
- Regulatory Compliance Coordinator
- Analytic Consultant
- Data/Audit Specialist
- Billing and Denial Analyst
- Financial Operations Analyst
- Build/Maintain/Support EMR
- Senior Application Analyst
- Coding Expert

Salary table for RHIA Positions:

This table shows the difference in salaries for non-credentialed and credentialed individuals.



Assessment Project 2: Increase enrollment of the BS/MS program to 40% of eligible HIM students. Then evaluate the success of the student in their Health Informatics (HI) classes versus the HIM.

Student Learning Outcomes:

There was previously not a bridge for the HIM program to feed into a master's program. The HI master's degree is now building this bridge. 2015–2016 was the first year for the BS/MS.

Assessment:

While it is excellent to get the students to participate in the BS/MS program, and evaluation is easy by running reports on how many fourth-year students are eligible and how many apply, there needs to be evaluation on the number of students who are eligible. The 3.25 cumulative GPA should be attainable if the students are given assistance and the goal to strive to become a student of the BS/MS program. Students will be evaluated to see if they are successful in the HI classes.

Teaching Methods:

There has been a lack of simulation labs, partial real-world experience, and inability to give proper placement on practicum sites with needs in HI. The program director and her staff have worked to obtain more sites for student practicum placement so the students can get more one-on-one assistance and experience. There are new simulation labs inside MindTap and the AHIMA Virtual Lab that will allow the students to work with real cases and have more practice so they can retain more and enjoy the learning process. This experience should

- allow students to have better grades increasing the ability to apply for the BS/MS.
- make students more interested in the program.

- help in the area of overall student retention.

How could you measure each of the desired behaviors listed as assessment methods?

There will be a report run to check the number of eligible seniors that are allowed to apply for the BS/MS program. Of those students, there will be a comparison of how many apply and are accepted.

Outcome:

In 2016–2017, there were 18 total students in the HIM/HI program (8 graduated with the degree)

In 2017–2018 there were 11 students in the HIM/HI program (3 graduated with the degree)

In 2018–2019, there were 15 students in the HIM/HI program (11 graduated with the degree)

Assessment Project 3: Increase international student enrollment by building more on-grounds and online courses.

Student Learning Outcomes:

The program now offers both online and on-campus courses to help meet the needs of the international students. The classes are usually small, and it gives the teacher the opportunity to provide more individualized attention. The courses are also offered multiple times throughout the year. Human Anatomy and Human Physiology courses are now offered online by the Department of Biology. Math and English courses are now offered online. International students may only take one online course per semester.

All courses will be made available on grounds so that International Students will have the option to take any course with HIM prefix on grounds. This will save the online courses for those not controlled by the HIM department

Assessment:

All classes are now offered online and on campus thus increasing the opportunities for online students.

Each semester, the Director and Advisors will re-evaluate courses offered online to make sure that students have everything needed. If a student is missing a specific on grounds course, it can be offered to that student and lectured individually.

Teaching Methods:

Human Anatomy and Human Physiology have been placed online with the same content and coursework as on campus with simulation labs for evaluation of skills. There will be skill labs online to make sure that the skills can be practiced for Anatomy and Physiology with virtual dissections. Due to the student's future jobs, they will not need to do an actual dissection or autopsy. Math and English have evaluated their content to decide if it is possible for these classes to be taught online. Again, with these courses the content will need to remain the same as the on grounds classes. The students will need to show that they are able to be successful in the class.

All HIM courses that are taught on grounds in 2018 and going forward will be offered with an Instructor, even if there is only one student, and have weekly meetings. There will be weekly lectures, assignments with competencies, and exams to reinforce their knowledge. Students will be required to obtain minimum 73 percent on their on grounds courses just as they are for online courses.

How could you measure each of the desired behaviors listed as assessment methods?

The measurements will be done by comparison of the ability to deliver the same skill online as on campus. The participation will be examined but the key areas of evaluation will be the comparison of the skill lab scores that are done on campus and through distance education to determine whether there is a decrease in the students' scores. It is important that the classes through are offered through distance education, but it is more important that the content is not compromised. Students are required to do four exams in each course. They will not have other points in the course, to make up the points, the outcomes will be proven with 73% minimum in the course. These areas were started in 2017, held for one full year and now will be offered in Summer Session due to enrollment being up, excellent pass with curve, low DWF. Average percentage in the course was 88% over the 2017–2018 course year for each semester in both courses.

On grounds courses will be assessed with weekly lectures, assignments with competencies, and exams to reinforce their knowledge. Students will be required to obtain a minimum of 73 percent on their on grounds courses just as they are for online courses.

2017–2018 Assessment Projects

Assessment Project 1: Increase the use of Kaltura for all its classes to ensure students are engaged and reviewing the course content.

Student Learning Outcomes:

The tests results have been low for some of our students and this software will help us determine whether the student actually reviewed the lectures and for how long. This will help us to evaluate if they are using this feature to their advantage. This software also allows us to put questions inside the lecture and polls inside to make it interactive.

Assessment:

By placing the recordings online with lecture inside Kaltura weekly the HIM department can track the number of students that are participating in the course content. This will show the amount of time spent on the lecture area and how often they review this content.

Teaching Methods:

Kaltura lectures are added to the course, Kahoots, Competency projects, interactive books, even study guides are used to review the content before exams are given. There is peer tutoring offered, instructor tutoring, and optional study groups open.

How could you measure each of the desired behaviors listed as assessment methods?

The assessment of the use of Kahoots will be measured weekly by taking attendance. Students will get a percentage in this area. And there will be an area in the grade book that will be the evaluation in each course to see how the participation in each course is per semester. The goal is that it will be 100% by 2021 in all courses. The worst courses will be re-evaluated on instructor evaluations and competencies to see if there is an issue with the instructor or content if they cannot meet 80% overall participation for two semesters.

Assessment Project 2: Use Examity in all courses for tests and exams to prove student mastery of knowledge base.

Student Learning Outcomes:

With this software, there will be live proctoring of exams. This procedure will then allow us to make sure that the student is not using any resources; there is no cheating or compromising of the exams. That way we know students master the information for their course and the future credentialing exam.

Assessment: All online students will take their exams on Examity. The number of students found to be cheating per semester should not exceed 10%. Failure on Exams should not be over 20% inside a course, if it is, offer another exam as a bonus exam to see if this was due to area of weakness or the previous issue of not reading material.

Teaching Methods:

Examity is software that is inside Canvas; therefore, the students will have practice exams that do not count against them to practice. Students will set up accounts and schedule times with software to make sure they are proficient. This method will prepare them for their credentialing exam, and it will hold them accountable for knowing the information now.

How could you measure each of the desired behaviors listed as assessment methods?

The number of students in the course will be examined, with the percentage of failures due to cheating. Then examine the number of students that complain or ask for resets on their exam due to technical difficulty. When Completed there should be 80% minimum that meets or exceeds in the course. No more than 20% will DWF each semester after implementation and the percentage should go down each semester.

Assessment Project 3: Link all CAHIIM competencies to assignments.

Student Learning Outcome:

Implement the 102 competency outcomes inside Canvas, then apply a link to the assignments to get feedback to see where the strengths and weaknesses are for our students.

Assessment:

Canvas course competencies once linked will have the capability to be easily assessed to see where in there is low scores. This will allow for comparison between the credentialing exam

weakness areas and course domain weakness areas. This can break down the instructor specialty area domains and the domain outcomes of students on credentialing exams.

Teaching Methods:

Inside the exam the competencies would be put in and used to evaluate the student. Exams, study guides, Kahoots, and study groups allow for students to work with the information multiple times for re-evaluations.

How could you measure each of the desired behaviors listed as assessment methods?

The HIM department will evaluate the competency areas against the domains on the credentialing exam. Students must have 80% of their domains passed to pass their course. When a student does not pass the credentialing exam their competencies will be pulled and compared to determine whether the weakness match. Every semester the competencies in the courses will be examined to determine whether fewer than 10% struggle in the competencies area.

Assessment 4: All 2015–2016, 2016–2017 students were employed, and 91% of 2017–2018 students were employed.

Student Learning Outcome:

From 2015–2017 the annual employment average income increased because of students choosing nontraditional roles. In 2017–2018 reports, the students chose more traditional roles and the students income dropped substantially to an average of \$38,625 for credentialed students.

Assessment: In the student's final semester, data is collected about each graduate. The program will continue to monitor the student's place of employment.

Teaching Methods: Instructions about how to look for a job will be included in the Career Preparation class. Students will learn more about the appropriate salary range in classes such as the Health Information Management class and the Introduction to Health Information. The students will also be shown the AHIMA Career Map. Students will learn about the appropriate jobs to look for instead of entry level jobs or jobs that only require an associate's degree. The Career Services Specialist and the HIM faculty will continue to help students revise their resumes so that they can receive a higher paying job and a job in the health information management profession.

How could you measure each of the desired behaviors listed as assessment methods? The HIM faculty and the Career Services person will check in with the students periodically to determine whether they need help finding a job. The HIM Program will help ensure that at least 95% are employed in the field.

Assessment 4: Increase the subdomain scores for the RHIA exam so that we meet the national standard or exceed it.

Our HIM program requires that students take the RHIA exam during the program, whereas other programs may allow students to take the exam when they are ready, after they have graduated.

The following areas met or exceeded the RHIA National standards:

Task	IUPUI Standard	National Standard	Course Revisions that led to a successful rating
SDIC: Data Governance	72%	71%	Assignments were revised to improve critical thinking skills. Rigor was added to each of the assignments.
SDIIB: Data Privacy, Confidentiality	38%	38%	More AHIMA Virtual Lab assignments were incorporated into the curriculum. Assignments were revised.
SDIVA: Revenue Cycle Reimbursement	62%	62%	The flipped classroom was implemented so that students could receive more practice coding cases. AHIMA Virtual Lab was used in the course.

The following areas did not meet the RHIA National Standards:

In all classes Examity was implemented to prevent digital cheating.

Task	IUPUI	National	Course Revisions
SDIA: Classification Systems	60%	68%	MindTap was implemented. The rigor of the class was also increased. Tutoring was offered to the students. The flipped classroom was implemented. This section is reinforced in HIM-M 490 by study guides, lectures, and Kahoots.
SDIB: Health Record Content and Documentation	56%	57%	The rigor of the class was increased. Tutoring was offered to the students. We offer the course on grounds and through distance Education.
SDIC: Data Management	62%	64%	A new book was used in the course. Course assignments were revised.
SDIA: Health Law	57%	58%	More Virtual Labs were used in the Health Law and HIPAA class. HIPAA and Health Law were consolidated into one course. Assignments were revised to improve critical thinking skills. More time was spent on these

			topics in HIM-M 490 RHIA Exam Preparation class.
SDIIB: Information Strategic Planning	63%	68%	Assignments were revised. Course outcomes were realigned. There is a greater focus on Domain 3 in HIM-M 490 RHIA Exam Preparation Class
SDIVB: Regulatory	55%	57%	Incorporated the flipped classroom, relevant guest speakers. Increased the rigor to help improve critical thinking skills. Content is reviewed in HIM-M 490 RHIA Exam Preparation Class
SDIVC: Coding	77%	78%	Incorporated the flipped classroom, guest speakers. Increased the rigor to help improve critical thinking skills. Content is reviewed in HIM-M 490 RHIA Exam Preparation Class
SDVA: Leadership	60%	62%	CAHIIM competencies were realigned and moved to other courses. This change allows us to focus more on each topic. Students are given assignments that require critical thinking. The concepts are reinforced in HIM-M 490 RHIA Exam Preparation class.
SDVB: Change Management	65%	70%	CAHIIM competencies were realigned and moved to other courses. This change allows us to focus more on each topic. Students are given assignments that require critical thinking. The concepts are reinforced in HIM-M 490 RHIA Exam Preparation class.

Program Review and Assessment Report
**Master of Library and Information
 Science Program 2018–2019**

Prepared by the Department of Library and Information Science

I. GENERAL INFORMATION, INSTITUTIONAL DATA

This report focuses only on the Master of Library Science (MLIS) under the IUPUI School of Informatics and Computing (SoIC). The MLIS is currently housed under the Department of Library and Information Science (LIS), which joined SoIC on July 1, 2013.

The department consists of the

- Master of Library and Information Science (MLIS), a 100% online graduate (professional) degree program
 - Several MLIS dual-degree options, in which 10 or fewer students participate.
 - Undergraduate Minor in Data Studies, began fall 2017 and one in Applied Data Science which began in fall 2019
 - Undergraduate Major in Applied Data and Information Science began in fall 2019, along with two 4+1 plans of study and two standalone certificates which mirror the aforementioned minors
 -
- Faculty:
 - Full-time: 1 tenured associate professor, 4 tenure-track assistant professors, 3 lecturers.
 - Adjuncts (28 in total): all qualify for graduate teaching by having a master's or higher and significant (2+ years) professional experience in the topics they teach.
- Students (currently, MLIS only):
 - Headcount: 260 Spring 2019, 233, spring 2018, 218, spring 2017 (159, spring 2015). Geographic (for 2019): 177 Indiana, 51 domestic nonresident (22%), no international.¹
 - Students on average take 1–2 courses per term, through summers; approximate time to degree (39 credits) is 3 years.
 - Persistence/graduation rates: IUPUI Graduate/Professional Student Retention and Graduation. (IUPUI IRDS)

Cohort start year	Retained Year 2	Retained Year 3	Retained Year 4
Fall 2011	82%	78%	80%
Fall 2012	79%	74%	72%
Fall 2013*	78%	66%	
Fall 2014	84%	78%	
Fall 2015	83%	81%	
Fall 2016	83%	73%	
Fall 2017	87%		
Fall 2018			
Fall 2019			

*Change to all-online format; merger into SoIC from SLIS.

Cohort start Year	Graduated Year 3*	Graduated Year 4	Graduated Year 5
Fall 2011	37%	70%	73%
Fall 2012	27%	67%	72%
Fall 2013	32%	58%	
Fall 2014	31%	66%	
Fall 2015	44%	61%	
Fall 2016	24%		

¹ All other SoIC MS or Ph.D. programs: 286; of 174 domestic, 87% are Indiana, 13% non-Indiana; 40% are international.

**Percent graduated is cumulative.*

Cohorts of 2011 and 2012 are from "SLIS" data; from 2013 on, SoIC/LIS.

II. LEARNING OUTCOMES

Program-Level Student Learning Outcomes

The program's learning outcomes are based in the accreditation standards set forth by the American Library Association. Our program was successfully re-accredited in June of 2019.

Methods and Outcomes Overview:

Primary method:

ePortfolios. Direct measure, every student and every outcome.

Secondary methods:

Grades

Stakeholder input (advisory board, student survey)

Student learning outcomes are organized in the following areas:

- Approach professional issues with understanding
- Assist and educate [information] users
- Develop and manage collections of information resources
- Manage and lead libraries and other information organizations
- Represent and organize information resources
- Use research effectively
- Deploy information technologies in effective and innovative ways

<https://soic.iupui.edu/lis/master-library-science/learning-outcomes/>

Upon completion of the MLS in the LIS program, students will be able to

	RBT ²	PGPL ³
1. Approach professional issues with understanding	3	1, 4
2. Assist and educate [information] users	5	2, 3
3. Develop and manage collections of information resources	5, 6	1, 2
4. Manage and lead libraries and other information organizations	6	1, 2
5. Represent and organize information resources	4, 5	2
6. Use research effectively	3	2, 3
7. Deploy information technologies in effective and innovative ways	5, 6	2, 3

III. ASSESSMENT

Primary

Portfolios of student-selected artifacts demonstrating mastery of 4 of the 7 program outcomes. Requirement instituted for students entering as of Fall 2011. Originally designed within the Oncourse ePortfolio matrix system. This system did not include individual scores or individual feedback but did provide program-level information. Migrated in 2016 to Taskstream system. In the summer of 2019, the portfolio system moved once again, this time from Taskstream to Canvas.

Students admitted between Fall 2011 and Spring 2017 produced only a final portfolio providing multiple artifacts to demonstrate the mastery of each program goal. The students would also write a reflection essay for each learning outcome and sub-component.

Students starting in the Fall of 2018 or later are required to complete a mid-term portfolio around the completion of 18 credit hours using “early” course artifacts and one reflection essay, all of which is reviewed by the student’s advisor. An advising meeting is set at this point to discuss pathways to meeting future academic and professional goals. The inclusion of the mid-term portfolio review is a marked improvement over just the final portfolio review. The mid-term review allows for student learning to be impacted during their degree rather than just at the start of their professional careers, after course completion. We anticipate this will yield a higher level of retention and evidence of learning in the final portfolio review.

The students starting in Fall 2018 or later will also complete a final portfolio using artifacts from courses taken in the second half of the program. For 4 of the 7 learning outcomes and sub-components, students provide a reflection essay which includes a reflection on their mastery of the learning outcomes as well as professional development goals. One to three artifacts are provided for each goal selected to demonstrate mastery. These artifacts and the essay are reviewed and scored by a faculty member prior to graduation.

² RBT: Revised Bloom’s taxonomy

³ PGPL: Principles of Graduate and Professional Learning (1. Knowledge and Skills Mastery; 2. Critical Thinking and Good Judgment; 3. Effective Communication; 4. Ethical Behavior)

Data Set description

For students in the cohort, "Late [only], Academic 2017-2018."

For students who had submitted materials between September 2017 and mid-May 2018.

PG-1 Approach Issues: total of 30 students had completed

PG 2 Assist and Educate: 21

PG 3 Manage Collections: 24

PG 4 Manage and Lead: 27

PG 5 Represent and Organize: 27

PG 6 Use Research: 28

PG 7 Deploy Technology: 32

Data was recorded as to:

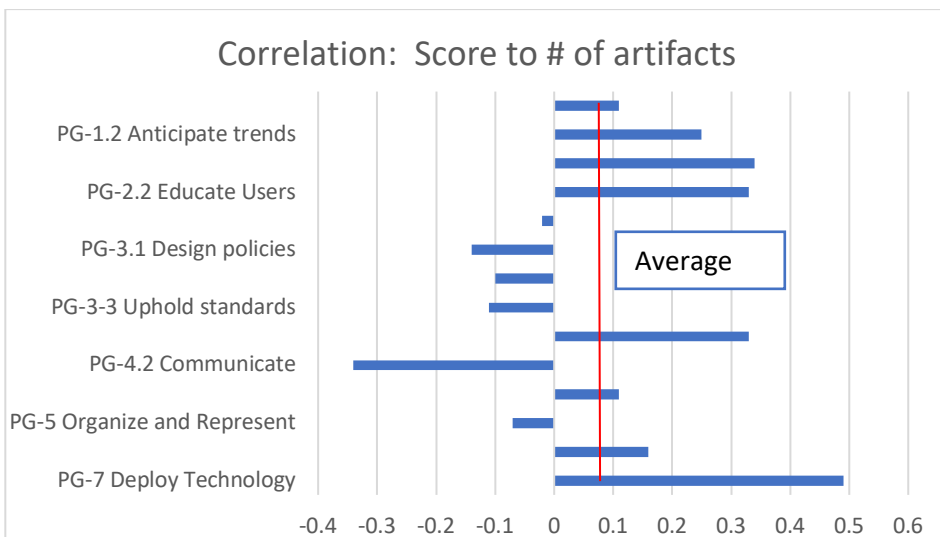
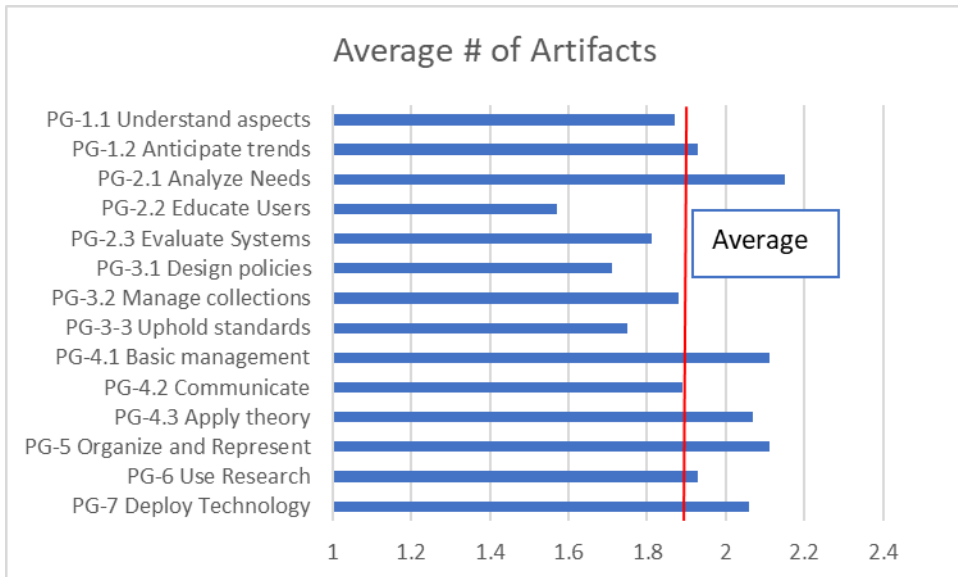
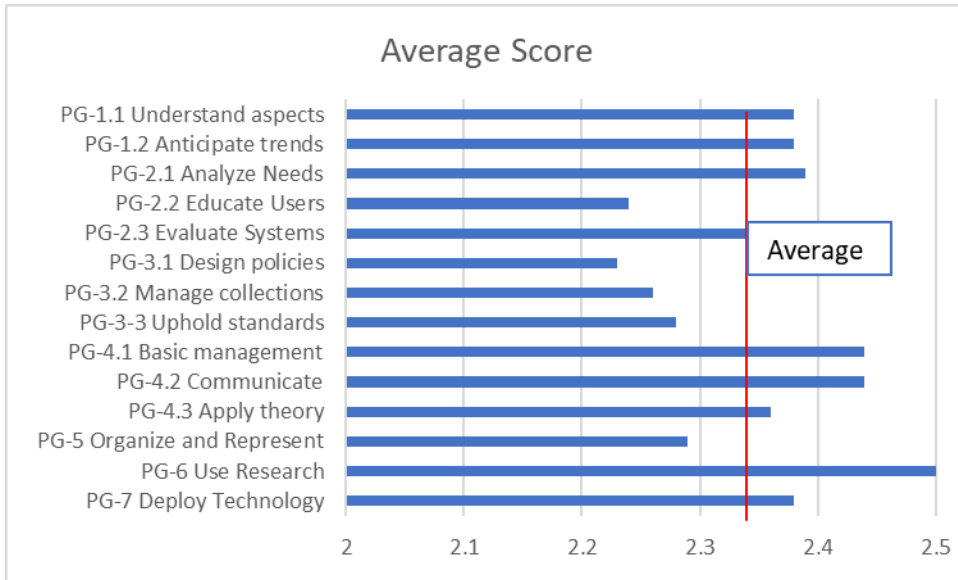
- **how many artifacts students selected**
- **overall rating for that PG or sub-PG**
- **what courses the artifacts came from**
- **what the name of the assignments were** (as far as could be determined)

Note that for PG 2 Assist and Educate, 3, Manage and Evaluate Collections, and 5 Organize and represent, there is a very tight connection with core classes S501, S502 and S503; in addition, S501 has been used to introduce the concept of the ePortfolio. S501 accounts for 36 of the 152 total artifacts for PG 2, and S503 accounts for 32 out of 56 for PG 5.

There is no consistent or substantial numerical correlation between overall score and number of artifacts selected.

There appears to be no numerical correlation between score and particular course or assignment, although there is so much skew in the data that it would be hard to detect. Note also that scores are not assigned to individual artifacts but to overall PG or sub-goals based on *all* artifacts plus the reflection.

Program Goal	Average Score (range: 2-3)	Average # of Artifacts	Correlation: Score to # of Artifacts
PG-1.1 Understand aspects	2.38	1.87	+.11
PG-1.2 Anticipate trends	2.38	1.93	+.25
PG-2.1 Analyze Needs	2.39	2.15	+.34
PG-2.2 Educate Users	2.24	1.57	+.33
PG-2.3 Evaluate Systems	2.34	1.81	-.02
PG-3.1 Design policies	2.23	1.71	-.14
PG-3.2 Manage collections	2.26	1.88	-.10
PG-3-3 Uphold standards	2.28	1.75	-.11
PG-4.1 Basic management	2.44	2.11	+.33
PG-4.2 Communicate	2.44	1.89	-.34
PG-4.3 Apply theory	2.36	2.07	+.11
PG-5 Organize and Represent	2.29	2.11	-.07
PG-6 Use Research	2.50	1.93	+.16
PG-7 Deploy Technology	2.38	2.06	+.49



Fall 2019 is the first semester to include “early” artifacts and mid-program review with advisors; faculty will be able to determine where there may be initial gaps in building a base for advanced study, as well as intervening specifically where individual students appear to struggle.

Secondary, indirect, supporting

- Grades. Indirect. All graduating students have received at least a B– (indicates basic mastery) in all core courses. For electives, grades must be a C or above with an overall GPA of 3.0 (again, indicating basic overall mastery).
 - Use: individual interventions for C, incompletes, and low GPA, according to program and school policies.
- Stakeholder input. Indirect/supporting.
 - Advisory Board: at twice-yearly Advisory Board meetings, participants discuss necessary skills for recent graduates.
 - Use: design of special courses, and improvement of the content of core courses. Based on advisory board member input and professional trends, two new specializations were created: Digital Curation (Fall 2018) and Archives Management (Fall 2019). Several new courses were created to support these two new specializations and an academic advisor was hired specifically for the Archives Management Specialization.
 - Students: Indirect/supporting. Periodic surveying of current students. Last conducted in spring of 2018.

Area of specialization or interest	Response Percent	Response Count
Public libraries (mainly children and/or young adult)	7.69%	5
Public libraries (other, general, adult)	10.8%	7
School libraries	3.08%	3
Academic libraries	16.9%	11
Archives	6.15%	4
Generalist	52.3%	34

Survey highlights: 65 respondents (approx. 30% of program headcount).

- The majority rate the core courses highly in terms of meeting their career goals: 29.41% “extremely well” and 45.10% “somewhat well.”

Most believe the program electives prepare them “extremely well” (45.2 %) or “somewhat well” (23.8%) for their career.

Student evaluation of internships vary likely due the vast differences in one internship location to the next. 18.18% indicated their internships prepared them extremely well for their career, 27.27% somewhat well, and 31.82% moderately well.

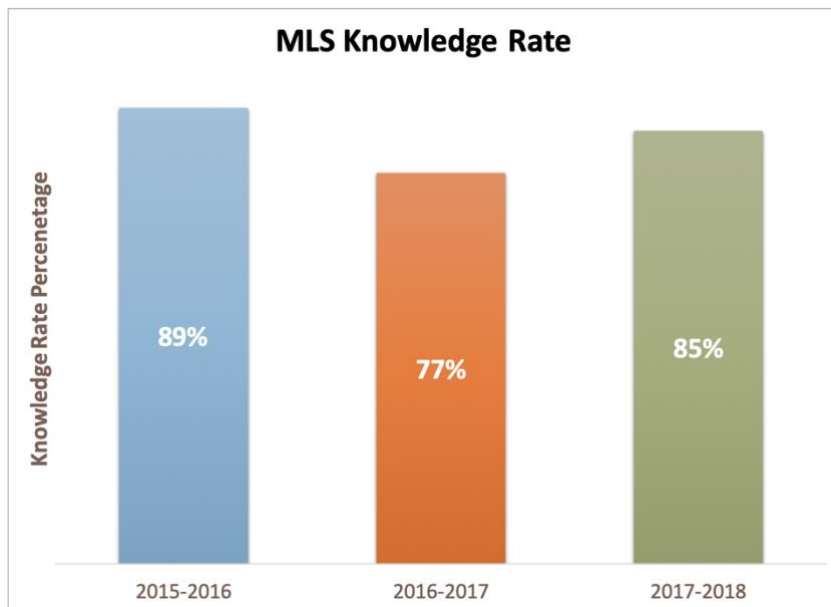
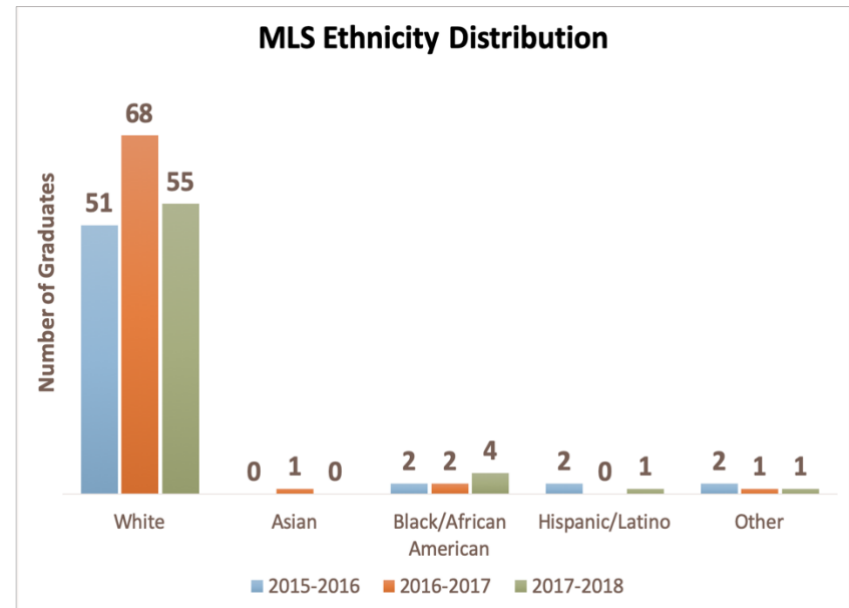
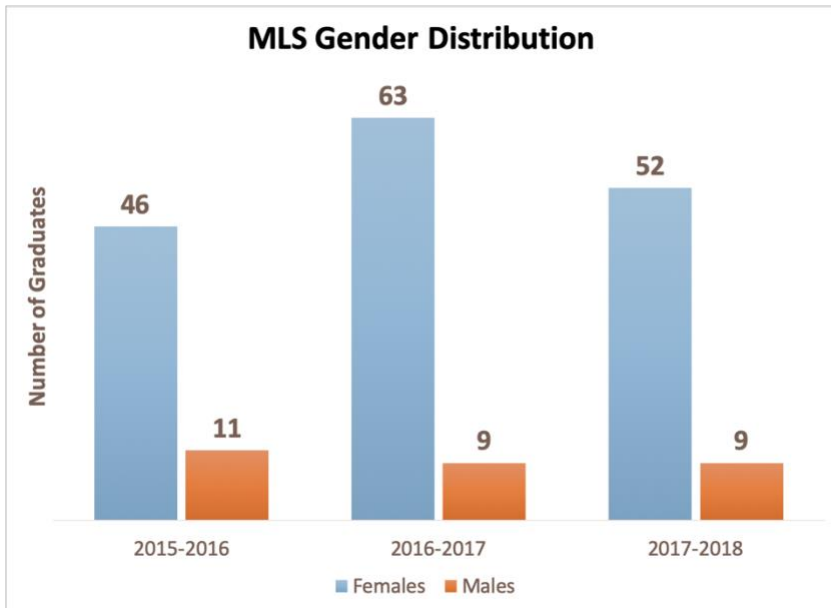
Detailed open-ended answers from students are primarily used to schedule courses (ALA accreditation standards: students are able to construct coherent programs of study.) Comments with respect to teaching methods are incorporated into departmental discussions.

The original schedule of assessments is as follows; highlighted sections were added:

Timing	Instrument	Administration	Review of results
February	Curriculum Survey Continued	By Curriculum Steering Committee	April, by CSC and then entire faculty
Fall and Spring Every year one of 5 core areas	Content-specific	Faculty in core courses	Fall faculty retreat
Biannual	Discussion: Alumni and Advisory Boards	Department Chair	Built into periodic MLS degree review
Completed each term by graduates	ePortfolio artifacts Continued, see above	Faculty Advisors	Fall faculty retreat
6 months after each graduation	Alumni surveys: SoIC and Library Journal ⁶ .	Department Chair/Career Services Staff	Fall faculty retreat

⁶A major library science journal, *Library Journal*, conducts a library school alumni/placement survey.

MLS Graduate Program Overview from July 2015 to June 2018*



Knowledge Rate Distribution

Year	FT in Major	PT in Major	FT Out of Major	PT Out of Major
2015-2016	86%	10%	4%	0%
2016-2017	100%	0%	0%	0%
2017-2018	78%	7%	13%	2%

Median Salary Reported by Graduates

Year	Salary Reported By	Total Number of Employable Students
2015-2016	24	57
2016-2017	20	31
2017-2018	19	61

*July 1, 2015 – June 30, 2016; July 1, 2016 – June 30, 2017; July 1, 2017 – June 30, 2018

MLS Graduate Program Overview from July 2015 to June 2018*

List of Employers 2015-2016	
Job Title	Company
Adult Programming Coordinator	Hancock County Public Library
Children's Librarian	Campbell County Public Library
Director of Bremen Public Library	Bremen Public Library
Director of Library Services	Clear Creek Baptist Bible College
Early Childhood Assistant	Kendallville Public Library
Head of Circulation	Elkhart Public Library
Library Clerk	Jefferson Township Public Library
Media Specialist	Zionsville Schools
Project Archivist	Historic Madison Inc.
Public Services Associate	Indianapolis Marion County Public Library
Records Analyst	Indiana Archives and Records Administration
Reference Manager	Vigo County Public Library
Research Librarian	Faegre Baker Daniels, LLP
Sales Associate	Western Reserve Historical Society
School Librarian	Southport High School

List of Employers 2016-2017	
Job Title	Company
Administrative Specialist	Dorel Juvenile Group
Adult Services Librarian	Speedway Public Library
Branch Librarian	Vigo County Public Library
Circulation Clerk	Anderson Public Library
Copywriting Specialist	Yellow Pages Group
Director	Lincoln Heritage Public Library
Family Case Manager II	Indiana Department of Child Services
Head of Technical Services	Lowell Public Library
Independent Distributor	Houston Community College
Library Associate	Dallas Public Library
Public Service Associate	Indianapolis Marion County Public Library
Public Services and Outreach Manager	Indiana University Bloomington
Reader's Advisor	Evansville Vanderburgh Public Library
Research and Technology Specialist	University of Tennessee at Chattanooga
Technical Systems Specialist	Danville Community School Corporation

List of Employers 2017-2018	
Job Title	Company
Access Services Staff	DePauw University
Assistant Experience Manager	Evansville Vanderburgh Public Library
Branch Clerk	Wells County Public Library
Children's Services	Mishawaka Public Library
Database Specialist	IU Health
Digital Media Specialist	Xavier University of Louisiana
Director	Hagerstown Jefferson Township Public Library
Evening Circulation Senior Assistant	IUPUI Ruth Lilly Law Library
Head of Career Services	Porter County Public Library
HR Coordinator	Wanderlust Austere
Information Services Librarian	Brownsburg Public Library
Law Librarian and Pose Coordinator	Vanderburgh County Circuit Court
Library Media Specialist	Connersville Middle School
Planning & Analysis Analyst	ADESA
Programming and Outreach Librarian	Crown Point Community Library

*July 1, 2015 – June 30, 2016; July 1, 2016 – June 30, 2017; July 1, 2017 – June 30, 2018

Other support programs

Advising

Graduate Program Advising and Orientation: The graduate program coordinator engages with students to orient them from admission to graduation to fulfill the necessary verifications and requirements to maintain academic standing, including grade requirements.

Plan of Study Advising: From the time of admission, the Department Chair and student advisor (chosen by the Department Chair) provide general guidance to the students on the plan of study, course load for each semester, selection of electives, and suggestions to contact specific faculty for specific interests or projects. The Department offers an online advising handbook for students and instructors (<https://iu.box.com/v/advising-handbook>) that contains checklists for each specialization. Additionally, every student will meet with their advisor after completing approximately 18 credit hours in conjunction with the initial portfolio review.

Career development

Students are encouraged to do internships that prepare them for a professional career. LIS graduate students can take advantage of experiential learning opportunities as elective credits throughout their program for up to six credit hours. It is in these internship environments where they are able to integrate knowledge and theory learned in the classroom with practical application and skills development in a professional setting under the supervision of a mentoring supervisor and course instructor.

As of Fall 2018, it is required that students who do not already have good, relevant work or volunteer experience do an internship to be competitive in the job market. Internships can occur after 18 credits; students arrange their own though there is an internship database with listings. There are other for-credit options to have individualized experiences and learning. Check out the 601, 602, 605, 606 Guidelines (<https://iu.app.box.com/v/lis-601-602-605-606-guidelines>).

Student organizations

The Association for Library and Information Science Students is an organization for IUPUI LIS students and alumni to meet regularly, socialize, and discuss topics relevant to the profession.

Center for Teaching and Learning

Effective learning with Canvas is essential in an online program. The Center for Teaching and Learning provides a number of different text-based and multimedia resources to help students get acquainted with Canvas' tools and affordances. Find more at <https://ctl.iupui.edu/Teaching-Online>

News about MLS students, faculty, and alumni

August 26, 2019

[Privacy expert Kyle Jones says student data collection can lead to ethics concerns](#)

January 28, 2019

[Faculty work featured in new digital humanities research methods book](#)

January 8, 2019

[First Wilma Gibbs Moore Graduate Endowed Scholarship recipient seeks MLIS](#)

December 13, 2018

[Library and Information Science grads win grants to do great things](#)

November 14, 2018

[LIS alumnus empowers organizations, teachers, and students with technology](#)

May 1, 2018

[LIS professor receives IMLS grant to research learning analytics and privacy](#)

January 3, 2018

[Library and Information Science alumna receives “Up and Comers” Award](#)

October 26, 2017

[Professors receive IMLS grant to assess library capacity](#)

**Bachelor of Science in Media Arts and Science
Program Review and Assessment Report 2018–2019**

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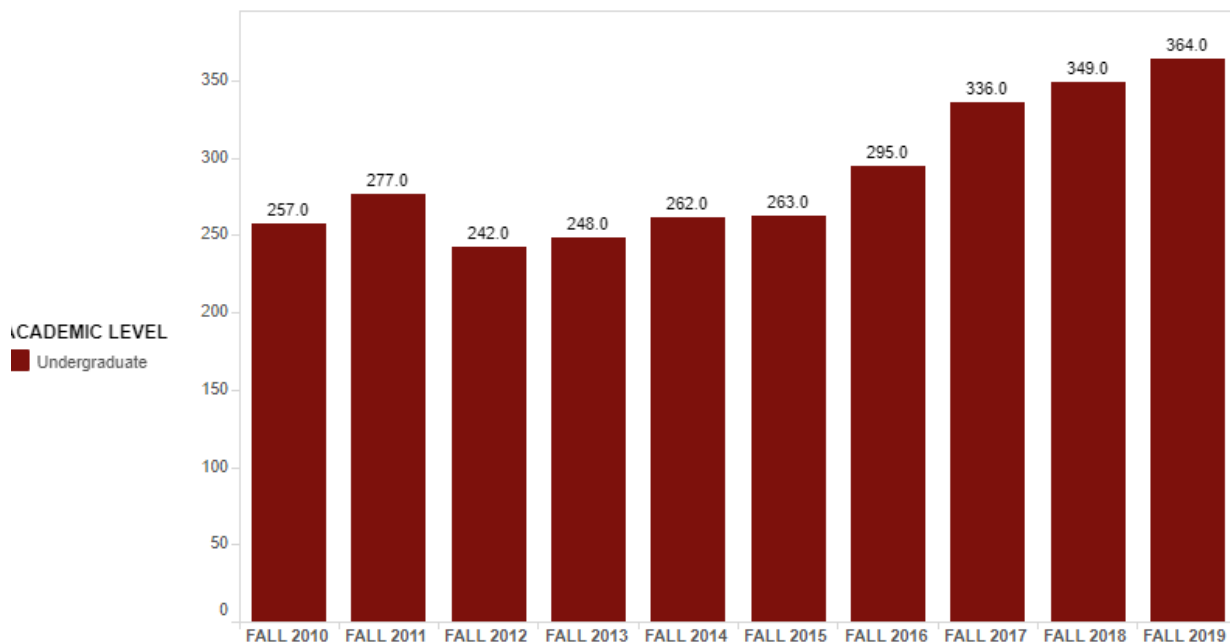
General Information, Institutional History, Program Enrollment Data

This review focuses on the Media Arts and Science (MAS) Undergraduate Program under the IUPUI School of Informatics and Computing.

MAS Program is housed under the Department of Human-Centered Computing (HCC), which was founded on July 1, 2013. When Media Arts and Science (MAS) was established in 1999, it was a stand-alone program at IUPUI. MAS was integrated into the School of Informatics when it was established in 2000. Since then, MAS has been the largest program in the IUPUI portion of the School. It combines strong research and education expertise in instructional technology, healthcare digital media, emerging media environments, entertainment production, and advanced interdisciplinary research at the forefront of media arts and science.

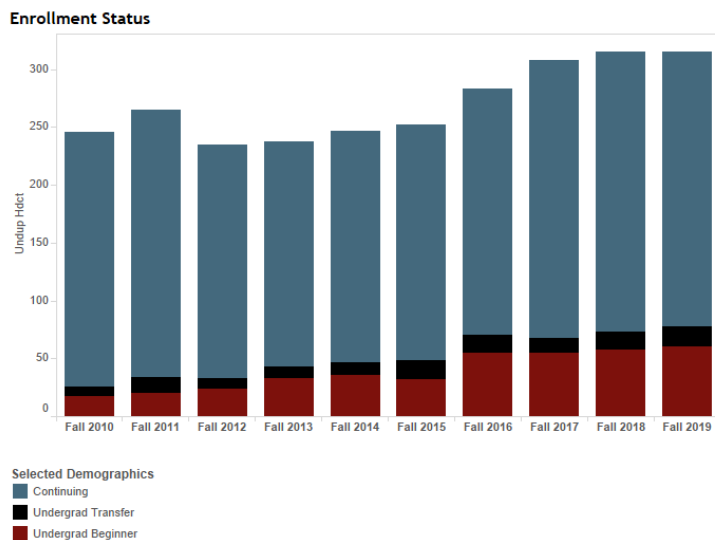
MAS Enrollment Data August 20, 2019

Unduplicated Headcount by Career



(Census 9_4_2019) - Headcounts	
Levels	Counts
Human Comp Intn MS/MAS BS	3
Media Arts & Science BS	416
Media Arts & Science MS	14
Media Arts & Science MS/BS	4

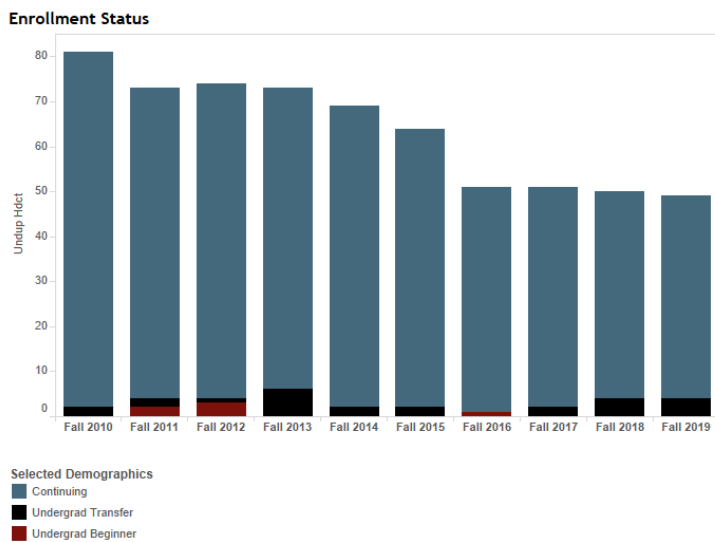
Full Time Enrollment, Media Arts and Science Bachelors of Science



Enrollment Status

	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
Continuing	220	231	202	195	200	204	213	240	242	237
Undergrad Beginner	17	20	24	33	36	32	55	55	58	60
Undergrad Transfer	9	14	9	10	11	16	15	13	15	18
Grand Total	246	265	235	238	247	252	283	308	315	315

Part Time Enrollment, Media Arts and Science Bachelors of Science



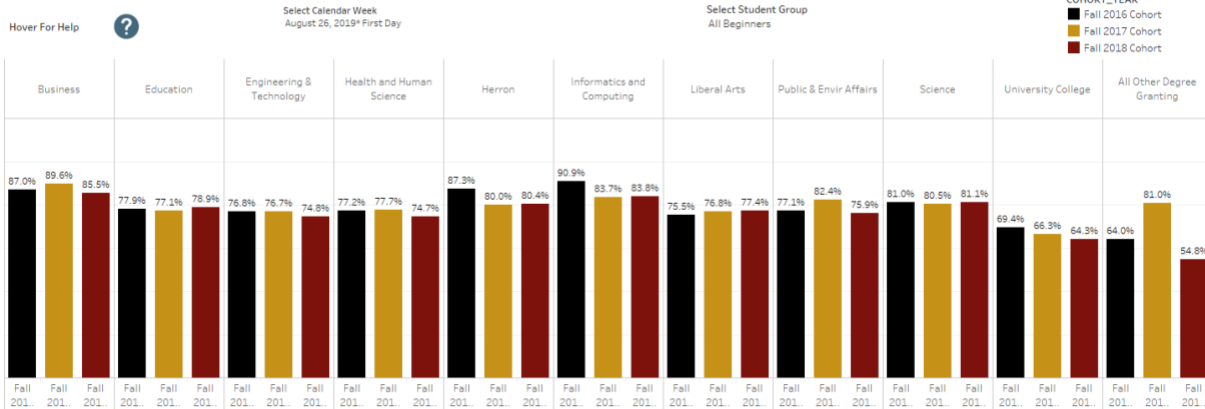
Enrollment Status

	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
Continuing	79	69	70	67	67	62	50	49	46	45
Undergrad Beginner		2	3				1			
Undergrad Transfer	2	2	1	6	2	2		2	4	4
Grand Total	81	73	74	73	69	64	51	51	50	49

First Year Enrollment, Media Arts and Science Bachelors of Science



Point-in-Cycle Enrollment Management



	Fall 2016 Cohort						Fall 2017 Cohort						Fall 2018 Cohort								
	N	Dismissed	% Dismissed	# Enrolled	% Enrolled	1 Yr Enrol Dif	1 Yr % Dif	N	Dismissed	% Dismissed	# Enrolled	% Enrolled	1 Yr Enrol Dif	1 Yr % Dif	N	Dismissed	% Dismissed	# Enrolled	% Enrolled	1 Yr Enrol Dif	1 Yr % Dif
Business	123	0	0.0%	107	87.0%			144	0	0.0%	129	89.6%	22	2.6%	145	0	0.0%	134	85.5%	-5	-4.1%
Education	77	0	0.0%	60	77.9%			70	0	0.0%	64	77.1%	-6	-0.8%	67	1	1.8%	65	78.9%	-9	-1.9%
Engineering & Technology	340	0	0.0%	261	76.8%			322	2	0.6%	247	76.7%	-14	-0.1%	305	0	0.0%	228	74.8%	-19	-2.0%
Health and Human Science	224	0	0.0%	173	77.2%			206	1	0.5%	160	77.7%	-19	-0.4%	182	8	4.4%	136	74.7%	-24	-2.9%
Herron	118	1	0.8%	103	87.3%			120	0	0.0%	96	80.0%	-17	-7.3%	148	0	0.0%	119	80.4%	23	0.4%
Informatics and Computing	99	3	3.0%	90	90.9%			98	5	5.1%	82	83.7%	-8	-7.2%	117	6	5.1%	98	83.8%	16	0.1%
Liberal Arts	143	0	0.0%	108	75.5%			138	1	0.7%	106	76.8%	-2	-1.3%	106	0	0.0%	82	77.4%	-24	0.5%
Public & Envir Affairs	70	0	0.0%	54	77.1%			68	1	1.5%	56	82.4%	-2	-5.2%	54	3	5.6%	41	75.9%	-15	-6.4%
Science	431	0	0.0%	349	81.0%			441	0	0.0%	355	80.5%	6	-0.5%	439	1	0.2%	356	81.1%	1	0.6%
University College	1,962	158	8.1%	1,802	69.4%			2,055	198	9.6%	1,363	66.3%	1	-0.1%	1,920	195	10.2%	1,234	64.3%	-129	-2.1%
All Other Degree Granting	25	0	0.0%	16	64.0%			21	0	0.0%	17	81.0%	1	17.0%	42	0	0.0%	23	54.8%	6	-26.2%

Graduation Rates Media Arts and Science Bachelors of Science



Hover for Help ?

CAMPUS

Indianapolis

SCHOOL

All

ACADEMIC PLAN

Media Arts & Science BS

GENDER

All

FIRST GENERATION

All

21st CENTURY SCHOLAR RECIPIENTS (FIRST FALL)

All

ETHNICITY

All

RESIDENCY

All

AGE

All

Honors

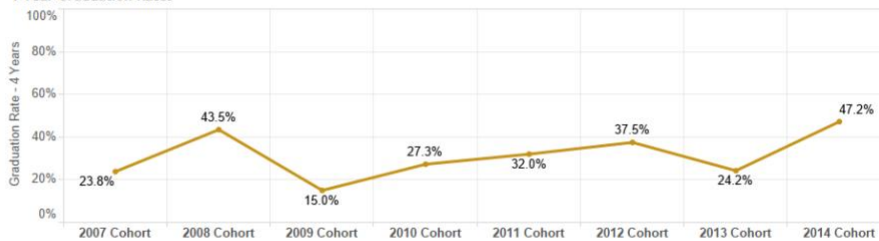
All

Includes only first-time, full-time baccalaureate degree-seeking beginners who earned a bachelor's degree from any IU campus by census of the indicated fall semester. All demographics are as of the student's first fall term.

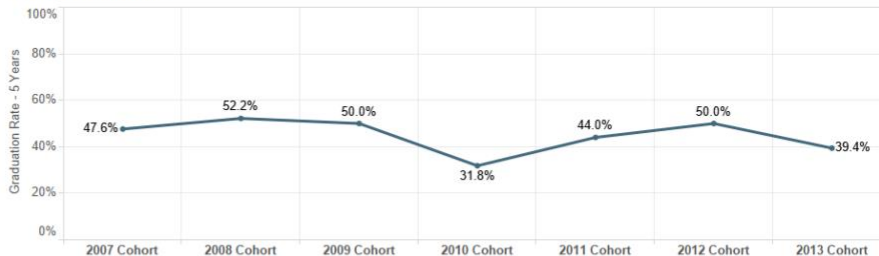
- Graduation Rate - 4 Years
- Graduation Rate - 5 Years
- Graduation Rate - 6 Years

Graduation Rates of Full-Time, Bachelor Degree Seeking Beginners

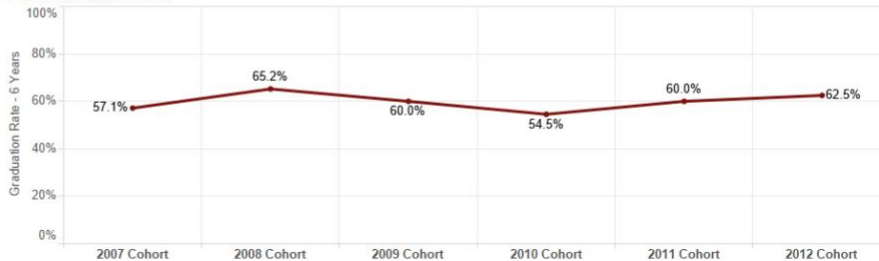
4-Year Graduation Rates



5-Year Graduation Rates

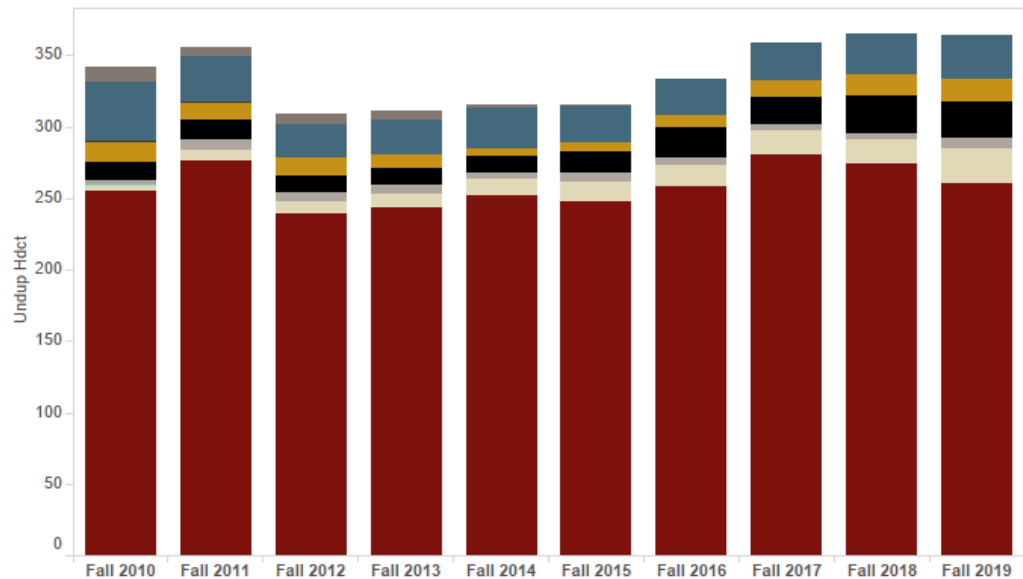


6-Year Graduation Rates

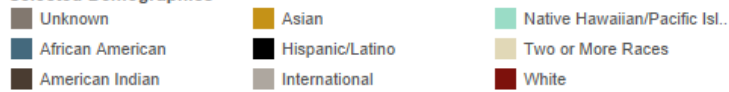


Ethnicity, Media Arts and Science Bachelors of Science

Ethnicity



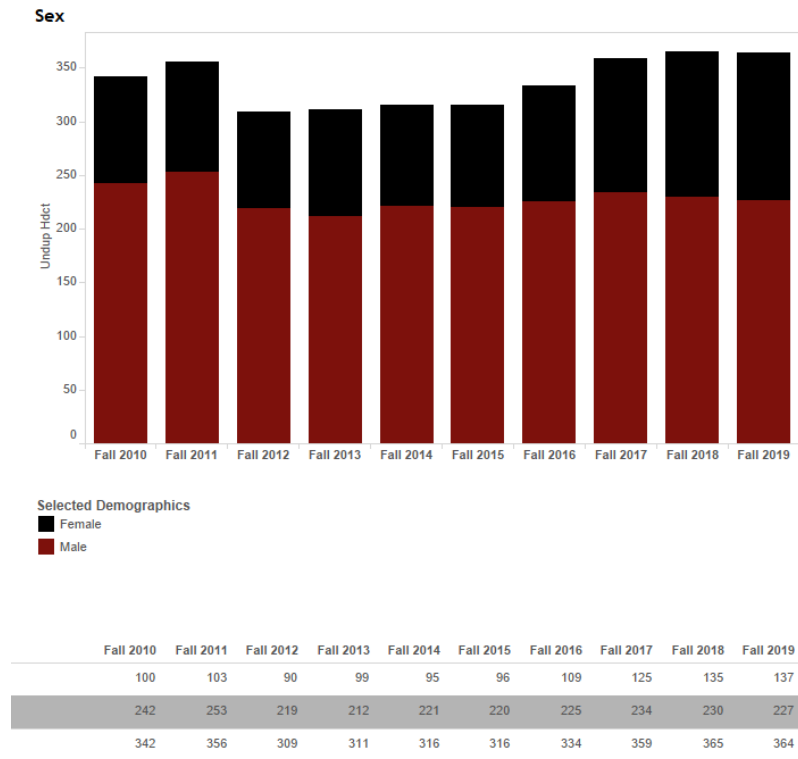
Selected Demographics



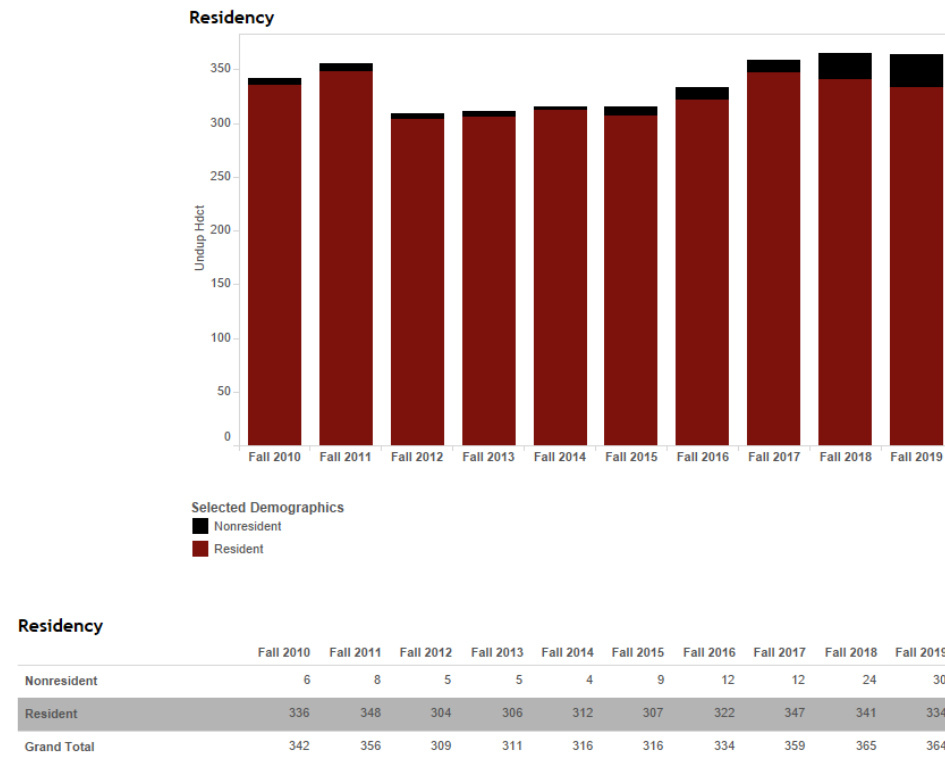
Ethnicity

	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
African American	41	31	24	24	28	26	26	27	28	31
American Indian	1	1								
Asian	14	12	12	10	5	6	8	11	15	15
Hispanic/Latino	12	14	12	12	12	15	22	19	27	26
International	4	7	6	6	4	7	5	4	4	7
Native Hawaiian/Pacific Island	1									
Two or More Races	3	8	9	10	12	13	15	17	17	25
Unknown	11	7	7	6	3	1				
White	255	276	239	243	252	248	258	281	274	260
Grand Total	342	356	309	311	316	316	334	359	365	364

Gender Media Arts and Science Bachelors of Science



Residency (State) Media Arts and Science Bachelors of Science



Retention, Media Arts and Science Bachelors of Science



Total Students Retained for Full-Time, Bachelor Degree Seeking Beginners

Hover for Help

REPORT TYPE
Retention Totals

CAMPUS
Hennepin

SCHOOL
All

INTENDED MAJOR
All

ACADEMIC PLAN
All

GENDER
All

ETHNICITY
All

FIRST GENERATION
All

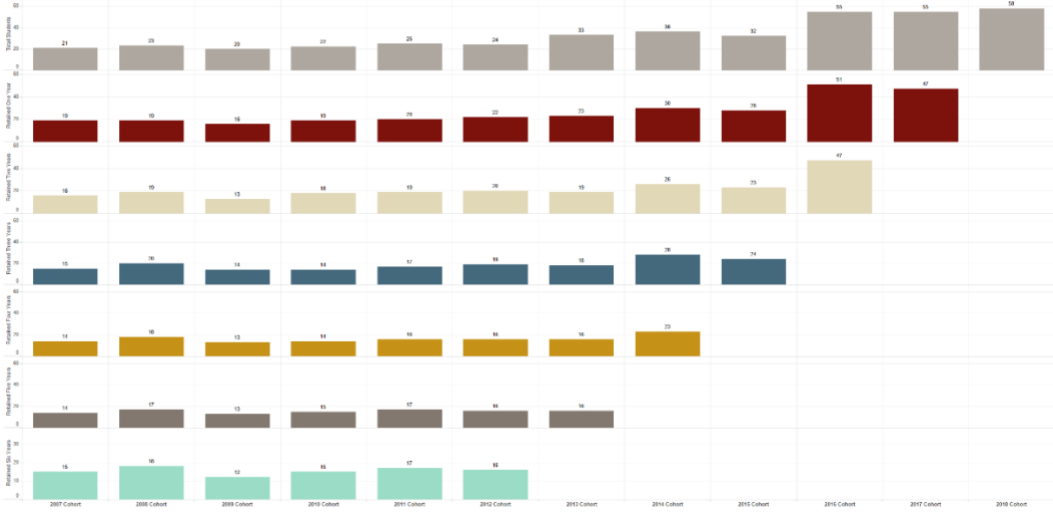
21st CENTURY SCHOLARSHIP RECIPIENT @ FIRST FALLS
All

REFERENCE
All

AGE
All

HOUSING
All

- Total Students
- Total Retained 1 Year
- Total Retained 2 Years
- Total Retained 3 Years
- Total Retained 4 Years
- Total Retained 5 Years
- Total Retained 6 Years
- Total Retained 7 Years
- Total Retained 8 Years
- Total Retained 9 Years
- Total Retained 10 Years
- Total Retained 11 Years
- Total Retained 12 Years
- Total Retained 13 Years
- Total Retained 14 Years
- Total Retained 15 Years
- Total Retained 16 Years
- Total Retained 17 Years
- Total Retained 18 Years
- Total Retained 19 Years
- Total Retained 20 Years
- Total Retained 21 Years
- Total Retained 22 Years
- Total Retained 23 Years
- Total Retained 24 Years
- Total Retained 25 Years
- Total Retained 26 Years
- Total Retained 27 Years
- Total Retained 28 Years
- Total Retained 29 Years
- Total Retained 30 Years
- Total Retained 31 Years
- Total Retained 32 Years
- Total Retained 33 Years
- Total Retained 34 Years
- Total Retained 35 Years
- Total Retained 36 Years
- Total Retained 37 Years
- Total Retained 38 Years
- Total Retained 39 Years
- Total Retained 40 Years
- Total Retained 41 Years
- Total Retained 42 Years
- Total Retained 43 Years
- Total Retained 44 Years
- Total Retained 45 Years
- Total Retained 46 Years
- Total Retained 47 Years
- Total Retained 48 Years
- Total Retained 49 Years
- Total Retained 50 Years



Purposes, Reputation, and Aspirations of the Media Arts and Science Undergraduate Program

1. Reputation

- a. For the last three years an effort to amplify the robust offerings across the five MAS specializations has been underway:
 - i. 3D Graphics and Animation
 - ii. Digital Storytelling
 - iii. Game Design and Development
 - iv. Video Production and Sound Design
 - v. Web Design and Development
- b. The depth and breadth of the five specializations in the MAS program are reflected in both the faculty and the diversity of organizations that hire its graduates. Organizations ranging from animation, cloud services, education, entertainment, product design, medical prototyping, film, and telecommunications are a small representation of the types of organizations that hire MAS graduates with specialized skillsets and talents. MAS students apply their skills to nearly every industry vertical.
- c. Some current employers of MAS students are Evanced Solutions, Google, McGraw- Hill Higher Education, Netflix, Pearson Education, Pixar, Industrial Light and Magic, Cantina Creative, Blizzard Entertainment, Bradley & Montgomery, Salesforce, Online Resources, Inc., Telamon, and Warner Music Group and IU School of Medicine

2. Program Content

a. *Distinctive characteristics*

The focus of MAS is on applied creativity and digital storytelling while enhancing contemporary in-demand media and career-focused skills. The MAS program offers education and experience on various integrated media venues in today's media-driven and media-convergent society. Students produce dynamic websites, smartphone apps, interactive educational experiences, serious and entertaining games, and simulations, 3D motion graphics, digital illustrations, and 2D and 3D animations, audio and video, 3D printing, augmented and virtual reality experiences. The program is designed to be flexible for students, while being encouraged to concentrate on specialty tracks or declare to broaden studies in multiple tracks. Specializations include an average of (24–30 credits) in 3D graphics and animation; digital storytelling; game design and development; video production and sound design; and web design and development. When a student completes a specialization, it will be listed on the diploma as such. Many students complete multiple specializations representing the professional of tomorrow, a multimedia professional that understands the importance of bridging media communications and technologies across all domains, media environments, and business sectors.

b. *Structure, breadth, and depth of the program*

The Bachelor of Science in Media Arts and Science focuses on applied research and business application of media strategy, skills, and storytelling. The degree is oriented towards professional practice and relies on a foundation drawn from disciplines that study communication as sight, sound, motion, play, and interaction. Skills and knowledge embedded in this degree program include web, mobile, and multimedia design, web and mobile 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 digital storytelling and marketing content. For example, students learn to develop a website from scratch with 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 industry-standard documentation, plan projects, allocate and budget resources, and practice with an understanding of ethical, legal and regulatory considerations.

Once students take the foundational courses in both technical and creative domains, they choose a specialization to become fluent in the use of contemporary media tools and project management principles to create media with meaning. Specializations allow customizing a student's education in those aspects of media and production best suited for their

career goals. MAS students take two career-specific courses; one course (N299) focuses on resume-building and initial portfolio preparation, cover letters, and job shadowing while the other focuses on portfolio development iteration and public dissemination (N399). Prior to preparation for their capstone, *the final wrap-up of a student's educational experience*, students take (N420) Multimedia project development to learn about product planning and design, timelines, nurturing client relationships and project management tools to enable students to develop confidence in working with a client, developing a project plan as well as preparing for a likely career of contracting in the workforce.

c. Interdisciplinary program offerings.

The undergraduate degree has a 4+1 bachelors/masters degree option with the M.S. in Human-Computer Interaction or to continue into a 4+1 towards the MS in Media Arts and Science, in which students apply the latest research and principles of design, psychology, business, engineering, and/or computing to create innovative and human-centered interactive technologies in trending media environments (augmented, virtual or mixed reality environments).

MAS also has an 18-credit Studio Art and Technology minor offered jointly with the IU Herron School of Art and Design that combines courses from Media Arts and Science, Fine Arts, and Visual Communication Design. SoIC students are introduced to and become proficient with a wide variety of skills related to drawing techniques, design thinking, artistic and visual forms, and visual communication design that complement the cutting-edge technology and digital media design and production courses in the MAS program.

MAS also offers two (15-credit) minors for non-degree seeking students at IUPUI in the following areas: 3D graphics & Animation and Game Design and Development.

d. Desired learning outcomes for students:

The MAS program has ten major learning outcomes for undergraduate students. Graduates of the Media Arts and Science undergraduate program will demonstrate expertise in the following core competencies essential to success as informatics, computing, and information technology professional specializing in new and interactive media:

- i.* Understand digital media and its effective use as a form of communication
- ii.* Communicate ideas effectively in written and oral form to a range of audiences
- iii.* Work effectively as a member of a team to achieve a common goal
- iv.* Analyze a problem, identify and evaluate alternatives and plan an appropriate solution

- v. Appreciate the history, theory, and traditions of digital media. Evaluate media from multiple perspectives using the theories, concepts, and language of digital media
- vi. Demonstrate mastery of the concepts, techniques, and tools in one or more digital media specialties
- vii. Apply knowledge and skills to develop professional-quality digital media productions in a timely manner and utilizing best practices and standards.
- viii. Explain the impact of digital media on individuals, organizations, and society
- ix. Acknowledge diverse opinions regarding professional, ethical, legal, and social issues with a global perspective.
- x. Plan for continuing professional development with an appreciation of the need for lifelong learning.

e. Response to Trends in Disciplines

In 2013, the Associate Dean for Academic Affairs observed that the BS in Media Arts and Science lacked clear progressions through courses that built on each other to competencies required for specific job positions. The alumni careers data, which Career Services had begun to gather, showed that some students were unable to find jobs in their major after graduation. Typically, these students simply went through the program taking whatever course interested them because there were no specific requirements beyond taking a minimum number of upper-level courses in the MAS major. Although the major had informal areas of specialization, course progressions leading to employability in the major were not clearly specified. While course progressions existed, they were obscured by inconsistent course titles.

The HCC Chair initiated faculty committees to the five areas of specialization, and this effort enabled faculty teaching within each of these areas to carefully examine the curriculum and the relation between courses. The faculty began to redesign the curriculum accordingly. Specifically, the faculty identified job positions associated with each of the five areas, and competency areas and student learning outcomes required for those job positions. This effort led the faculty to redesign existing courses and propose new courses. The Associate Dean worked with the MAS faculty to renumber and rename many of the undergraduate courses to make course progressions clear. For example, the sequence Multimedia Authoring Tools, Multimedia Content Management, and Online Document Development were given consistent names, Introduction to Multi-Device Web Development, Intermediate Multi-Device Web Development, Advanced Multi-Device Web Development, and consistent numbers, N115, N215, and N315.

The faculty also identified among students a lack of artistic design skills required of practitioners in their intended fields (e.g., web design, game design, 3D graphics, and animation). To avoid course duplication, the faculty and HCC

Chair collaborated with the Herron School of Art and Design in creating the Studio Art and Technology minor to enable MAS students to receive recognition for taking drawing, sculpture, and other art-related courses as well as enabling Herron students to receive recognition for taking digital media-related courses from the MAS program. The minor was approved in spring 2015.

Although the five specializations have not yet been formally proposed as their own majors, with faculty approval, the Associate Dean renamed specializations within the BS in MAS that had become obsolete and fallen into disuse more than a decade prior to correspond to the titles of the five majors. The renamed specializations were made transcribable upon graduation, so potential employers could verify them from the final transcript and the specializations first appeared on the transcripts of the graduating class of May 2015. The faculty continues to consider the merits of separate majors, which show expertise in a narrower area but may make it more difficult for a student to transition into a new area and also might smack of a trade school rather than the program's broader curriculum, which includes a general education core and media arts and science core. Nevertheless, the specializations provide a useful springboard for designing minors and certificates in these five areas. The HCC Department proposed one minor and certificate in the 2015-2016 academic year and two minors *mentioned above* in 2017.

The trend in careers both in the Midwest and nationally show no slowing in career outlook in any of the five specializations. The digital storytelling specializations have been reconfigured to serve the digital marketing needs of companies looking to adjust to audience demand of marketing, media making, and reaching audiences on social media platforms. In 2019, courses in brand strategy, social media strategy, analytics and directing visual narratives have been added to amplify MAS student critical thinking towards creating messaging for their clients that perform towards a companywide strategy, brand and ever-evolving audiences in the online digital marketing sectors.

f. Curricular philosophy

The philosophy has shifted from encouraging students to indulge their interests in supporting employment in major/specialization. The design of majors/specializations that support career aspirations has been a key emphasis of the Indiana State government and the Indiana Commission for Higher Education. Given that media arts and science encompasses fields that are firmly rooted in technology and the unfilled demand for employees in many technology sectors, it is generally expected that students will be employed in major upon graduation. The response to the change in philosophy extends beyond the redesign of the curriculum and the establishment of five specializations. Engagement with industrial partners with respect to student internships, capstones, and project and portfolio critiques has increased as has interaction with the HCC department's Advisory Board.

The program has set the goal of 100% employment rate in major for its graduates. While improving, a major impediment to achieving this goal for students in the Game Design and Development specialization is that jobs are typically out of state, and students are often reluctant to leave Indiana. A number of solutions have been proposed, including out-of-state internships (*Hoosiers in Hollywood Partnership [see below]*) and the incorporation of more skills in web and mobile software development within the MAS core, user experience design, and entrepreneurship in the game specialization especially relating to the emerging media environments virtual and augmented reality. There is also concern that as the number of graduates in the 3D Graphics and Animation specialization grows, central Indiana may reach market saturation. Advanced niche courses had been added, targeting the application of 3D technologies to new areas, such as the use of 3D prototyping and printing in medicine and dentistry, patient education videos, digital preservation, virtual reality and augmented reality experiences.

3. *Career Focused Interventions (2016 -)*

a. In 2016, to increase the number of students getting careers in state, MAS faculty have increased the urgency of undergrad students by creating sequential portfolios and demo reel iterations beginning sophomore year in N299. Portfolios and demo reels are industry standards of professional job applications in the majority MAS fields. Instead of having (2) career courses in the degree program, faculty now usher (4) total portfolio touchpoints over the last three years of the Media Arts and Science bachelors degree.

1. Faculty first review all student’s portfolio sophomore year in N299 at week 8 and 16.
2. Students revisit their portfolio and publish online junior year in 399.
3. Students then use their portfolio/reels to be paired with clients in N420 Multimedia Production Development (also revamped in fall 2016), which pairs MAS student teams with local nonprofits, startups, and researchers on campus, in Indianapolis and abroad. Several partnerships are with clients at the national and international level that often continue development as internships, capstones, or full-time junior level positions. Over each calendar year, our students pair with an average of (30-40) client partners, which has also brought much-needed renown and marketing in the form of professional word-of-mouth for the MAS program, locally. Fall 2019 has seen our largest student cohort of 58 students and 24 potential client partnerships.

Below see the long list of client partnerships developed over the last three years in N420:

N420 project partners (internal and external)	
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* Artifacts & Artifiction, Ben Harrison Presidential Site N420	Fall 2019
* VR Decision Making Prototype (internal) N420	Fall 2019
* Web Based Bone Model Dissector, IUSM N420	Fall 2019
* D.A.R.E. Indiana N420	Fall 2019
* Digital Life AR App, UC Amherst N420	Fall 2019
* Gamers Hall (Internal) N420	Fall 2019
* Idea Garden, UITS IUB N420	Fall 2019
* Indiana Musical Education Association N420	Fall 2019
* Project Keyhole, Ben Harrison Presidential Site N420	Fall 2019
* ACM Siggraph ScavengeAR App 2020 N420	Fall 2019
* Attendance App (internal) N420	Fall 2019
* SoIC Diversity Portal (internal) N420	Fall 2019
* Surgical Pattern Recognition, IUSM N420	Fall 2019
* United Way of Indiana N420	Fall 2019
* Veil of Ahmun, Tommy Reddicks N420	Fall 2019
* Digital Life AR Mobile App N420	Spring 2019
* IUPUI Idea Garden Marketing Campaign N420	Spring 2019
* IMEA Online Music Education Videos N420	Spring 2019
* Polis Center's IUPUI 50th Anniversary Timeline N420	Spring 2019
* Benjamin Harrison Presidential Site Crowd Printing Website N420	Spring 2019
* SIGGRPAH Augmented Reality App, Vancouver N420	Spring 2019
* Medical Education – Coma Video, IUSM N441	Fall 2018
* 3D/VR Recreation of Madame Walker Theatre N441	Fall 2018
* Beablery Brokery e-Commerce Website N420	Fall 2018
* Benjamin Harrison Presidential Site Marketing N420	Fall 2018
* Benjamin Harrison Presidential Site Crowd Printing Website N420	Fall 2018
* Benjamin Harrison Presidential Site VR Museum N420	Fall 2018
* BlueWall, Inc VR prototype N420	Fall 2018
* Digital Life AR prototype N420	Fall 2018
* Hope Training Academy + Gameapalooza VR Web-Tour N420	Fall 2018
* GG Circuit/ EBash Experimental eSports UI N420	Fall 2018
* Harrison Center for the Arts AR prototype N420	Fall 2018
* IMEA Online Music Education Videos N420	Fall 2018
* Bepko Learning Center AR App N420	Fall 2018
* Polis Center's IUPUI 50th Anniversary Timeline N420	Fall 2018
* Career Services Software Audit – IUPUI N420	Fall 2018
* NewFields Pointillism AR App N420	Fall 2018
* Stars Struck Marketing (internal) N420	Fall 2018
* Stars Struck Production (internal) N420	Fall 2018
* Throwback Athletics Social Media Campaign N420	Fall 2018
* Veil of Ahmun AR + Boardgame Prototype N420	Fall 2018
* SIGGRPAH Augmented Reality App, Vancouver N420	Spring 2018
* Indianapolis Motor Speedway, Parts Petting Zoo N420	Spring 2018
* McCoy Youth Foundation Application Research N420	Spring 2018

* Newfield's Augmented Reality App(s) N420	Spring 2018
* Capture(d) N420	Spring 2018
* CAUSI Center Website N420	Spring 2018
* Artifact & Artificion 3.0 N420	Spring 2018
* Jacob Dobson Augmented Reality Art Instillation (internal) N420	Spring 2018
* Douglass Papers Online Journal N420	Spring 2018
* IUPUI VR Asset Modeling Team N420	Spring 2018
* Harrison Center Marketing Video N420	Spring 2018
* Riley Children's Video Templating, IUSM N420	Spring 2018
* Game Time Website N420	Spring 2018
* 3D Print Mold Department of Surgery IUSM N420	Fall 2017
* AR Paleontology Gary Motz N420	Fall 2017
* Ben Harrison President Site N420	Fall 2017
* Critical View Department of Surgery N420	Fall 2017
* Crossroads 2017 N420	Fall 2017
* Domestic Violence Website N420	Fall 2017
* Drone Footage in VR N420	Fall 2017
* Keep Indy Beautiful N420	Fall 2017
* Medical Visualization Department of Surgery N420	Fall 2017
* Mental Imagery Training Department of Surgery N420	Fall 2017
* Online Resources PRI AR App N420	Fall 2017
* StarsStruck & Freetown N420	Fall 2017
* Tinker Street N420	Fall 2017
* University Transfer Office App N420	Fall 2017
* University Transfer Office Video N420	Fall 2017
* Medical Visualization Department of Surgery N420	Fall 2017
* Medical Visualization Department of Surgery N420	Fall 2017
* Medical Visualization N441	Fall 2017
* StarsStruck N441	Fall 2017
* Despotiko Video N441	Fall 2017
* Washington Street VR N441	Fall 2017
* Bethel VR N441	Fall 2017
* IUPUI VR Welcoming Grant N441	Fall 2017
* SIGGRPAH Augmented Reality App N420	Spring 2017
Transfer Single Articulation Pathways IUPUI Informational Video N420	Spring 2017
* Sports and Tourism Management Marketing Video N420	Spring 2017
* Prideflight Marketing Video N420	Spring 2017
* Presidential Crowdprinting Ben Harrison House N420	Spring 2017
* 3D Scanning and Cleanup of Prehistoric Fossils IUB Gary Motz N420	Spring 2017
* Mobile App Gifted Custom Art N420	Spring 2017
* Augmented Math App Crossroads Education N420	Spring 2017
* Children's Museum Outdoor Sports Legends App Market Research N420	Fall 2016
* Transfer Single Articulation Pathways IUPUI Informational Video N420	Fall 2016
* Kaffeine Coffee Marketing Video N420	Fall 2016
* Greenwood Community Schools Marketing Video N420	Fall 2016

* Milktooth Marketing Video N420	Fall 2016
* Augmented Math App Math Assistance Center N420	Fall 2016
* Handsmith 3D Printed Robotic Hand Prosthetic	Fall 2016
* Plastics Design Lab	Fall 2016
* 3D Scanning and Printing for Radiation Bolus & Burn Masks	Fall 2016
* 3D Printing for Historical Preservation Ben Harrison House	Fall 2016
* Artifact and Artification Benjamin Harrison House	Fall 2016
* Virtual Reality Environment Freetown	Fall 2016
* Virtual Reality Environment Washington Street	Fall 2016

4. The last portfolio touchpoint is the students displaying both their capstone project and their MAS portfolio or demo reel at the semesterly capstone event.
 - b. In Spring 2017, SoIC began marketing a MAS BS to MAS MS 4+1 Degree offering where MAS students could continue to earn a Bachelors and Masters of Science in Media Arts and Science within 5 years.
 - c. In 2017 MAS began tracking student declared specializations by encouraging students to declare early with advisors their intended goals and linking them to one of the five specializations. In the past, we would see students taking a few 4XX level courses and never refining their skills sets. By encouraging early declaration, the result is far fewer MAS students meandering about and taking fewer courses based on curiosity across the specializations.

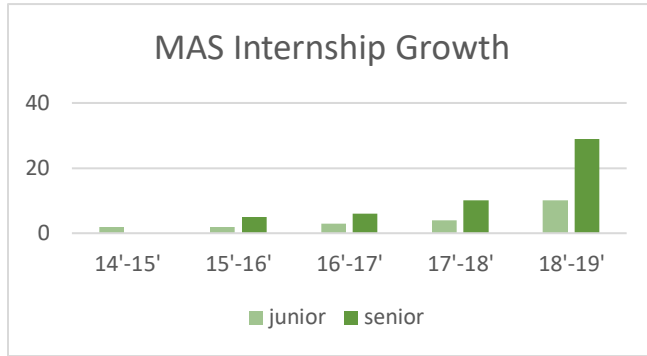
Frequencies of ACAD_SUB_PLAN_DESC	
Specializations/ Major	Counts
3D Graphics and Animation	51
Digital Storytelling	43
Game Design and Development	57
Video Prod & Sound Design	51
Web Design and Development	29
Currently Undeclared Specializations	185

- d. In 2018 MAS faculty added (3) capstone options for MAS students to choose from in an effort to achieve the following:
 - i. Increase # of internships and *RISE* experiences for each student, prior to graduation
 - ii. Reduce the # of 1-on-1 mentorships with faculty in interest to free up valuable research and scholarship of teaching time
 - iii. Create a traditional 16-week course for students looking to strategically pair their capstones with industry partners with the aid of senior faculty.

As a result, many students are opting to locate an internship to count for

their capstone, faculty are less taxed with mentoring upwards of (30) students per semester (based upon faculty popularity), and students are more frequently connecting their skillsets to applied needs of local partners and businesses.

- e. Starting Fall 2019, MAS offers a Dual Degree option for students interested in finding in-demand work as 'Full Stack' Developers. Students can earn two degrees in four years; a BS in Informatics and a BS in the Web Specialization of Media Arts and Science to have skills in both backend and frontend web design and development respectively.
- f. In 2019, SoIC Career Services and Media Arts and Science partnered with the '*Hoosiers in Hollywood*' program, an internship program sponsored by IUB's Media School. In its first fall 2019 cohort, (4) MAS students are interning in Los Angeles. Each MAS student secured (2) *or more* internships in their specialization. MAS has four more students in the Hoosiers in Hollywood program spring 2020. The long term outlook of this partnership is to grow the number of MAS students regularly participating and to ultimately create a strong alumni base in one of the largest regions for MAS; entertainment-oriented careers in film, animation and game industries on the west coast.
- g. With the above interventions added, we already see the younger cohorts secure far more frequent internships prior to graduation, and there are early indications of increased base salary and in industry careers for our graduates.



MAS Career Data

Year	Total count	Place-able	Placed	Knowledge Rate (%)	Median Salary
2015-'16	61	50	44	88	34000
2016-'17	59	57	47	82	50500
2017-'18	80	71	57	80	51000



3D Modeler
3D Animator
3D Print Consultant
Architectural Designer
Audio Engineer
Call Center Manager
Client Experience Designer CO-Founder
Digital Marketing Specialist
E-Commerce Web Designer Event Technician
Freelance Producer,
Videographer, Photographer
Front-end Developer & Designer GA New Media and web specialist Graphic
Designer
Amazon
Blizzard Entertainment,
Bradley & Montgomery
C2C Studio, Inc. Caldwell VanRiper
Cantina Creative,
Circle City Virtual Assistance City of Westfield
Diverse Talent Strategies Engaging Solutions
Evanced Solutions
Freelancer
Google,
Harrison Center for the Arts
Howler Studios
Indiana University Bloomington Indianapolis Spring
Industrial Light and Magic,
Indy Gaming LLC
IronKlad Studios
IU Health
IU School of Medicine
IUPUI
Koeus Solutions

**MAS (BS) Position Titles (Median Salary=
\$51,000)**

Interactive Multimedia Developer Interactive
Programmer
Junior Graphic Designer Marketing
Associate
Mobile Developer
Mobilization Operations Project Manager Motion
Capture Animator
Network Administrator Owner
Product Designer
Simulation Technician Solutions
Specialist Sr. Business analyst
UI/UX Designer
UX Project Specialist
Virtual Reality Developer
Web/Graphic Designer

MAS (BS) Company List (not exhaustive)

Lenovo
Memory Ventures
Nemasons Inc. Neverending Games
McGraw- Hill Higher Education,
Netflix,
Omni Source Marketing
Online Resources, Inc.
Pearson Education,
PERQ
Pixar,
Plow Digital
Raytheon
Rock Shrimp Productions
Salesforce
Self-employed
Sysco
Tethys Interactive
Telamon,
UCOL Division of undergraduate education IUPUI
Veolia North America Verizon
Vineyard Community church
NIH Grant
Virtual Xperience
Vision 3 Studios
Warner Music Group

a. Goals in maintaining and scaling current energy in career readiness for our students will grow into the following areas/assessments

1. Publishing publically as a unified four-year expectation across specializations

- i. Students in all MAS specializations will be encouraged to make their assignments and projects public, especially portfolios, early and often. Contests, internships, and networking as a school will be directly benefiting from cohesive branding of MAS student work at all levels.
- ii. **Assessment** = (3) courses/MAS specialization that have milestone portfolio assignments that have required public showcasing, 1 each year, sophomore, junior, senior.

2. Increased public/private corporate collaborations

- i. Sustain private sector partnerships with N420 and alike courses
- ii. **Assessment** = # of student stories and partners listed on course and program advertising

3. Increase bridge to nationally known career markets in entertainment industries

- i. Develop direct internship bridge relationships with top industry corporations
- ii. Goal of (5) Entertainment industry internship partners
- iii. **Assessment** =
 - a. # of agreements,
 - b. scaling of Hoosiers in Hollywood students
 - c. # of alumni network in LA

4. Increase local and midwest vernacular connecting MAS to 'Tech' Stakeholders

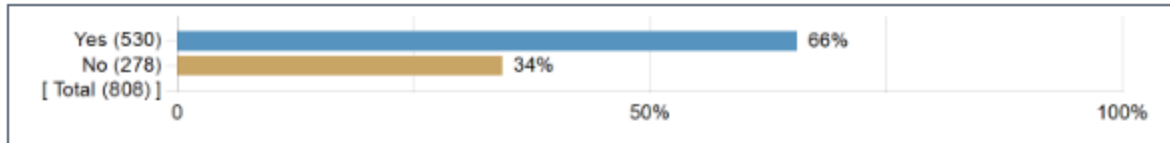
- i. Sound Strategy document in interfacing with state government on film and game company tax incentive, understanding of skills that translate to TECH careers in Indiana.
Assessments =
 - a. Integration of MAS into Techpoint and state initiatives
 - b. Tax incentive legislation for films and game productions
 - c. Entertainment Company growth, relocation to Indiana

10. Faculty and Course Evaluations Data + Planned Interventions

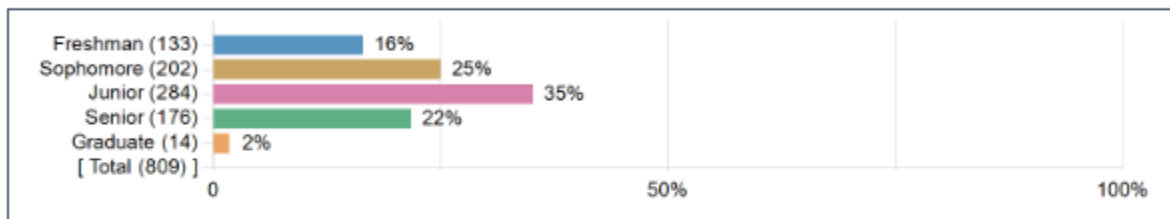
a. Program level Course Evaluations

Fall 2018 MAS Program Evals

Required Course?



Student's Class Level

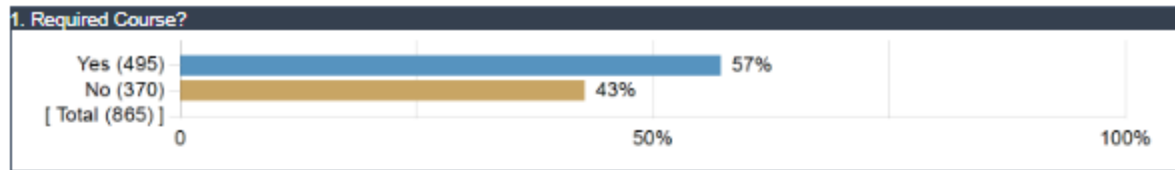


Course Questions

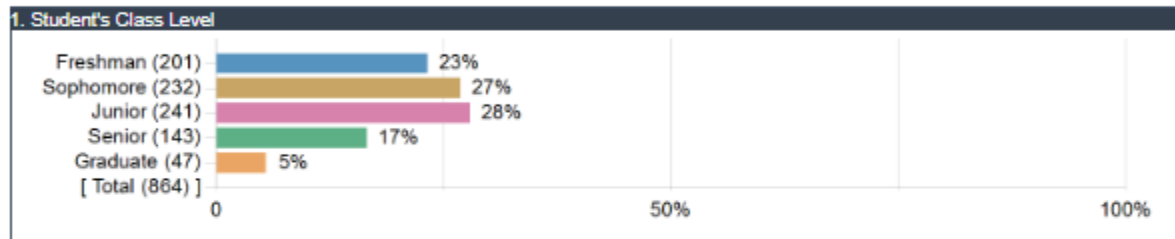
	Score Mean	Median	Count	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
Course goals and objectives are clearly specified	3.55	4.00	805	1 %	3 %	35 %	60 %
The syllabus for this course is easy to understand and follow	3.58	4.00	799	1 %	3 %	35 %	61 %
Course materials (textbooks, supplemental materials, course packs) are accessible, appropriate, and helpful	3.53	4.00	753	1 %	2 %	38 %	58 %
Papers, tests, projects, and other written assignments are graded and returned in a timely manner	3.39	4.00	793	2 %	8 %	40 %	50 %
I know what is expected of me in this course	3.48	4.00	805	2 %	5 %	37 %	56 %
The grading policy is transparent and easy to understand	3.45	4.00	800	2 %	6 %	37 %	55 %
Instructions on how to access online resources are sufficient and easy to understand	3.56	4.00	786	1 %	3 %	37 %	60 %
The course description accurately reflected the content of the course	3.52	4.00	795	1 %	4 %	36 %	58 %
The course required me to analyze information and write correctly formatted, logical and sensible reports	3.45	4.00	711	2 %	5 %	38 %	55 %
This course promoted critical thinking and problem solving	3.57	4.00	797	1 %	4 %	32 %	63 %
I know significantly more about this subject than I did before I took this course	3.54	4.00	800	2 %	6 %	30 %	63 %
I will use the knowledge/skills gained in this course in my profession	3.57	4.00	786	2 %	4 %	31 %	64 %

Spring 2019 MAS Program Evals

Required Course?



Student's Class Level

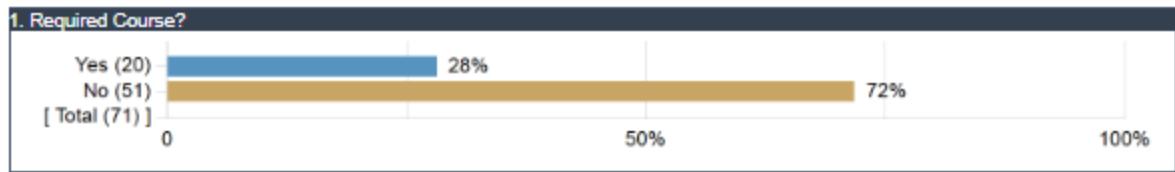


Course Questions

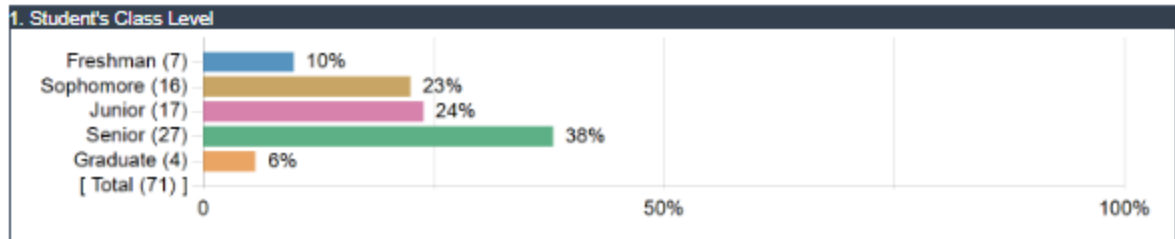
	Score Mean	Median	Count	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
Course goals and objectives are clearly specified	3.53	4.00	859	2%	3%	34%	60%
The syllabus for this course is easy to understand and follow	3.53	4.00	851	2%	3%	34%	61%
Course materials (textbooks, supplemental materials, course packs) are accessible, appropriate, and helpful	3.48	4.00	815	2%	4%	37%	57%
Papers, tests, projects, and other written assignments are graded and returned in a timely manner	3.35	3.00	848	3%	8%	40%	49%
I know what is expected of me in this course	3.47	4.00	858	3%	4%	36%	57%
The grading policy is transparent and easy to understand	3.42	4.00	852	2%	7%	37%	54%
Instructions on how to access online resources are sufficient and easy to understand	3.53	4.00	841	2%	2%	36%	59%
The course description accurately reflected the content of the course	3.50	4.00	848	2%	4%	36%	58%
The course required me to analyze information and write correctly formatted, logical and sensible reports	3.41	4.00	752	3%	5%	39%	53%
This course promoted critical thinking and problem solving	3.53	4.00	837	2%	3%	34%	61%
I know significantly more about this subject than I did before I took this course	3.51	4.00	852	3%	4%	33%	60%
I will use the knowledge/skills gained in this course in my profession	3.51	4.00	847	3%	5%	29%	62%

Summer 2019 MAS Program Evals

Required Course?



Student's Class Level



Course Questions

	Score Mean	Median	Count	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
Course goals and objectives and clearly specified	3.71	4.00	70	1%	0%	24%	74%
The syllabus for this course is easy to understand and follow	3.79	4.00	68	1%	0%	16%	82%
Course materials (textbooks, supplemental materials, course packs) are accessible, appropriate, and helpful	3.67	4.00	67	1%	3%	22%	73%
Papers, tests, projects, and other written assignments are graded and returned in a timely manner	3.58	4.00	67	1%	1%	34%	63%
I know what is expected of me in this course	3.74	4.00	70	1%	1%	19%	79%
The grading policy is transparent and easy to understand	3.69	4.00	70	1%	3%	21%	74%
Instructions on how to access online resources are sufficient and easy to understand	3.71	4.00	68	1%	3%	19%	76%
The course description accurately reflected the content of the course	3.69	4.00	67	1%	1%	24%	73%
The course required me to analyze information and write correctly formatted, logical and sensible reports	3.66	4.00	61	2%	2%	26%	70%
This course promoted critical thinking and problem solving	3.70	4.00	67	1%	1%	22%	75%
I know significantly more about this subject than I did before I took this course	3.79	4.00	71	3%	0%	13%	85%
I will use the knowledge/skills gained in this course in my profession	3.76	4.00	71	1%	0%	20%	79%

b. Quantitative Evidence of Program Learning Outcome Achievement in Media Arts and Science

i. Attempted adoption of SoIC's MS in Applied Data Science Methodology <https://khreda.com/vis/LearningOutcomes/>

1. To evaluate how well students are able to achieve the program's learning outcomes (PLOs), we conducted quantitative analysis of student grades for a few core courses in the program. Anonymized student grades were collected from instructors for courses taught in Fall 2018 and Spring 2019, and Fall 2019. The grades were broken down by individual assignment, project, exam, or quiz.
2. For example, if a course contained three assignments with 30

students enrolled, we collected the grade received by every enrolled student for each of the three assignments individually (i.e., a total of $30 \times 3 = 90$ assessment points). Grades were renormalized so that they range from 0 to 100 points to allow meaningful comparison between courses.

3. We then asked course instructors to map each assignment to one or more program-level PLOs in Fall 2019, and then aimed to work backward.
 - a. For Media Arts and Science this became problematic due to the generalized assessments across learning outcomes in each syllabi (see below example), leading to an opportunity to revise expected labeling of both assessments and outcomes within every MAS course syllabi as core priority in 2020.
4. We computed grade distributions from the above data. These distributions represent instructor assessment of students' mastery of each program-level outcome PLO. The distributions are plotted as histograms in the following table, broken down by course. The red line within the histogram plots represent a 80-point grade (considered a 'passing' threshold by many instructors). We also include the percentage of students (shown to the right of the histogram) who are considered to have mastered the intended outcome, having achieved a passing grade (≥ 80 points). The percentile is color coded in green ($\geq 70\%$), orange ($\geq 50\%$), or red ($< 50\%$).
 - c. Illustrating need for further refinement of per course assessment to PLO pairings program wide.

i. N420 Multimedia Production Development Learning, PLO's, and Assessments

Learning Outcomes:

Upon completion of this course, the student will	*RBT	IUPUI+	PLO's	Assessment
1. Create simulated production materials that exhibit understanding, evaluation and application of knowledge towards a multimedia project's and client's unique needs	5,6	P3.2; P4.1; P4.2; P3.4	7,8,9,10	Weekly Assignments, Milestones,
2. Define and evaluate a project by client's need, budget, and team.	4,5	P2.2; P3.1, P2.1; P3.4	3,4,10	Weekly Assignments
3. Analyze and evaluate case studies centered on media production and development.	4,5	P4.1; P4.2; P3.4	8,9,10	Weekly Assignments
4. Analyze and understand role in a team production centered on specific skill sets and research.	2,4	P1.4, P1.2; P2.2, P1.3; P3.4	2,3,10	Weekly Assignments, Milestones, Final Presentation
5. Implement self-imposed deadlines and time management to fulfill final project expectations and budget considerations.	3,4	P2.2; P3.4	3, 10	Weekly Assignments
6. Consider weekly, impact of role, document impact on project, critical communication of role with team.	4,5	P1.4, P1.2; P4.4; P3.4	2,8,10	Weekly Assignments
7. Document assets, code, and media produced for project, weekly.	5,6	P3.2; P4.4	2,8	Weekly Assignments
8. Define role in industry of choice through reflection of experiences in this course.	5,6	P3.3; P4.1; P3.4	7,8,10	Weekly Assignments
9. Develop pipeline for nurturing professional network, contract based work and creating independent living wage.	5,6	P3.4	10	Weekly Assignments

*RBT: Revised Bloom's Taxonomy: 1. Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Creating

1. Note that the assessments are not listed specifically to a particular weekly assignment with exception to 'milestones' and 'final presentation'.

2. This vague inclusion of multiple weekly assignments and milestones creates soft data when connecting to PLO understanding. (Which assignment has harsher student grades? Which has inflated grades? Which PLO does each assignment go to? Week 4 or week 9?)

3. Having indispensible # of weekly assignments connected to multiple PLOs can make understanding connections complex. (the goal should be 1 assessment = One PLO)

4. *More complexity.* Considering the additional requirement of MAS students selecting 1 of 5 specializations, PLO understanding may, in fact differ widely between the Web and 3D Animation specializations, for example.

ii. N420 Spring 2019, Sample Data (one assignment paired with one PLO)

1. 20 students in total
2. Red line represents 80% grade

	Grade Distribution	% of student meeting learning outcome
PLO 2 = 2.Communicate ideas effectively in written, oral, and visual form to a range of audience		100%
PLO 3 = Work Effectively as a member of a team to achieve common goal.		80%
PLO 4 = 4.Analyze a problem, identify and evaluate alternatives, and plan an appropriate solution		85%
PLO 7 = 7.Develop professional quality digital media productions by promptly applying knowledge and skills including best practices and standard		100%
PLO 8 = Explain the impact of digital media on individuals, organizations, and society.		90%
PLO 10 = Plan for continuing professional development with an appreciation of the need for lifelong learning.		65%

11. Action Items to improve Quantitative Analysis of per course assessments connected to PLOs for next PRAC report.

1. Reassessment of MAS Program Learning Outcomes
 - a. Consider 5 additional PLO's that are specialization specific
 - b. Consider if only 1 PLO is to be assessed per assignment
2. Each Syllabi must remap which weekly assignments are connected to which PLO's (ex. Weekly assignments 3, 6, 7 = PLO 8, milestone 1= PLO 2,3, Final Project = PLO 4,5,10 etc)

In the past three years, MAS faculty, students and alumni have been awarded many honors of recognition for their efforts in teaching, creative activity, storytelling and research. Frequency and impact within scholarship of teaching and research has increased far beyond preceding years' averages in the past three years.

MAS Student, Faculty, Alumni Accolades (Program Marketing)

MAS Faculty

Albert William, IUPUI Trustees Teaching Award, 2019
Travis Faas, SoIC Excellence in Engagement and Service Award, 2019
Albert William and Zebulun M. Wood, **Top Medical 3D Visualization**, American Thoracic Society *Measurement of Transpulmonary Pressure, a 3D visualization, May 16, 2018.*
Thomas Lewis, IUPUI Trustees Teaching Award, 2018
Albert William, SoIC Excellence in Engagement and Service Award, 2018
Zebulun Wood, SoIC Excellence in Scholarship of Teaching, 2018
Zebulun Wood, SoIC Excellence in Engagement and Service Award, 2017
Travis Faas, SoIC Excellence in Teaching 2017
Zebulun Wood, SoIC Excellence in Teaching, 2016
Joeseoph Defazio, SoIC Excellence in Teaching , 2016
Albert William, SoIC Excellence in Scholarship of Teaching, 2016

MAS Students

Alexander Douglas, Best in Show Game Award, 2019 Vector Game Conference
Jordan Nelsen IUPUI Top 10 student, 2018
Cade Jacobs IUPUI Top Undergrad Researcher
Cade Jacobs IUPUI Top 100 student, 2017
Riley Mineart IUPUI Top 10 student, 2016

MAS Alumni

James Ward, Alumni 2007, animator on Oscar Award Winning Spiderman: Into the SpiderVerse (2018)

Conferences Presentations/Publications Conference Awards

PUBLICATIONS (*not exhaustive*)

Travis Faas (lecturer)

Faas, T., Dombrowski, L., Brady, E., & Miller, A. (2019, March). Looking for Group: Live Streaming Programming for Small Audiences. In *International Conference on Information* (pp. 117-123). Springer, Cham

Faas, T., Dombrowski, L., Young, A., & Miller, A. D. (2018). Watch me code: Programming mentorship communities on twitch. tv. *Proceedings of the ACM on Human-Computer Interaction*, 2(CSCW), 50.

Faas, T., & Lin, C. (2017). Self-Directed Learning in Teacher-Lead Minecraft Classrooms. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (pp. 2569–2575). New York, NY, USA: ACM. <https://doi.org/10.1145/3027063.3053269>

Chaolan Lin, Travis Faas, Lynn Dombrowski and Erin Brady, “Beyond Cute: Exploring

User Types and Design Opportunities of Virtual Reality Pet Games”, 23rd ACM Symposium on Virtual Reality Software and Technology (VRST 2017).

Chaolan Lin, Travis Faas and Erin Brady, “Exploring Affection-Oriented Virtual Pet Game Design Strategies in VR”, 7th Affective Computing and Intelligent Interaction (ACII 2017).

Faas, T. (2016). An Introduction to HTML5 Game Development with Phaser.js. Boca Raton: A K Peters/CRC Press.

Albert William (lecturer)

Digital Humanities Handbook Book Chapter: *Virtual Bethel: Preservation of Indianapolis' Oldest Black Church*. Zebulun M. Wood, M.S. Lecturer, Media Arts and Science; Albert William, M.S. Lecturer, Media Arts and Science; Ayoung Yoon, Ph.D. Assistant Professor, Library and Information Science; Andrea Copeland, Ph.D. Associate Professor, Library and Information Science OCT 2017

IUPUI Study Abroad Advisory Council- contributed to the councils paper : **Study Abroad at IUPUI: A White Paper**

Zebulun M. Wood (lecturer)

Najmon, J., DeHart, J., Wood, Z., and Tovar, A., "Cellular Helmet Liner Design through Bio-inspired Structures and Topology Optimization of Compliant Mechanism Lattices," SAE Int. J. Trans. Safety 6(3):2018,

Najmon, J., (Author), DeHart, J., (Co-Author), Wood, Z. (Co-Author), Tovar, A., (Co-Author). "Development of a Helmet Liner through Bio-Inspired Designs and Topology Optimized Compliant Mechanisms," Society of Automotive Engineers. Approved for Publication January 22, 2018.

Copeland, Andrea, (Co-Author), Murillo, Angela P., (Author), Spotts, Lydia, (Co-Author), Yoon, Ayoung, (Co-Author), Wood, Zebulun M., (Co-Author), "Complexities of Digital Preservation in a Virtual Reality Environment, the Case of Virtual Bethel", International Data Curation Conference Proceedings. Accepted December 2017.

Copeland, Andrea, (Author), Wood, Zebulun M., (Co-Author), Spotts, Lydia, (Co-Author), Yoon, Ayoung, (Co-Author), "Learning through virtual reality: Virtual Bethel case study." Accepted. Proceedings of the iConference 2018. Accepted November 2017.

Book Chapters

Wood, Z.M., William, A., Copeland, A. Virtual Reality for Preservation: Production of Virtual Reality Heritage Spaces in the Classroom (forthcoming) CLIR REPORT 2019

Wood, Z.M., William, A., Yoon, A., & Copeland, A. *Virtual Bethel: Preservation of Indianapolis's Oldest Black Church*. *Research Methods for the Digital Humanities*. Palgrave Macmillan 2018.

PRESENTATIONS (not exhaustive):

Travis Faas (lecturer)

Local (Indianapolis, Indiana)

Modern Mixed Realities Indy	Starbase 11/24/2018	
Live Streaming From the Trenches Popcon		6/9/2018
Ready Player One Panel Science	Taste of 1/30/2018	
Nexttech Gamedev Workshop	Nexttech	1/20/2018
Teaching and Learning on Twitch.tv Science	Taste of 4/25/2017	
An Introduction to Typescript Indy	Dev Workshop 9/8/2016	

Regional

Game Dev Streams: How and Why Columbus Ohio	GDEX	9/29/2018,
Watch Me Code Muncie Indiana	Ball State CS	9/19/2018,
The Science and Art of Games Indianapolis, In.	IUPUI	4/8/2017,
Everyday Understanding Bloomington, In	NASAGA	10/16/2016,

International

Watch Me Code York, New York	CSCW 2018	11/7/2018, New
Looking For Group College Park, MD	iConf 2019	4/2/2019,

Albert William (lecturer)

Thursday, April 19, 2018 5:00 pm – 7:00 pm in Renaissance Ballroom II at the Renaissance Las Vegas *Despotiko, an Unknown Treasure*, Albert William, Thomas Lewis, Andy Townsend, IUPUI

Albert William Oct 30, 2017 IUPUI UITS Advanced Visualization Lab Debrief Session. *“SOIC Study Abroad in Paros, Greece”*.

Albert William Sept 15, 2017- Advancing Teaching and Learning with Technology Symposium *“3D Printing as a Classroom Tool”*

Albert William, April 11, 2017- Robert G. Bringle Civic Engagement Showcase (two separate posters)

*“3D Virtual Bethel | Historical and Cultural Preservation using Virtual Reality”
“Documenting Cultural Heritage on Paros, Greece”*

Albert William, Mar 24, 2017- IUPUI School of Informatics Library Information Science colloquium *“Participatory Heritage in an Age of 3D Virtualization”*

Zebulun M. Wood (lecturer)

Local

Wood, Z. M. (Presenter), Teaching Activity, Presentation, "3D Virtual Bethel Historical and Cultural Preservation", Indiana Campus Compact, IAHI, Academic, Local. (Sept, 21 2018).

Wood, Z. M. (Presenter), Teaching Activity, Presentation, "From War Stories to Reflections: Helping Students Situate and Articulate their Learning", Showcase - Campus Event, Associate Faculty Teaching, Center for Teaching and Learning, Panel, Academic, Local. (Sept 4th, 2018).

Wood, Z. M. (Presenter), Sunderlin, R., Johnson, J., Hyde, C., Teaching Activity, Poster, Contributed, "Artifacts and Artifiction| Two Years of Historical Preservation with Benj. Harrison Presidential Site", Showcase - Campus Event, IUPUI Robert G. Bringle Civic Engagement Showcase, IAHI, Academic, Local. (April 10, 2018).

Wood, Z. M. (Presenter), Teaching activity, Presentation, Invited, “Embedding Collaborative and Entrepreneurial Experiences in the Classroom” Presentation – Campus Event, IUPUI E.C. Moore Symposium on Excellence in Teaching., Indianapolis, Indiana, Academic, Local, (March 2, 2018)

Wood, Z. (2017, Dec 1st). Mentoring Collaborative Media Projects that Connect Classrooms to Community. School of Informatics and Computing Brown Bag, Indianapolis, IN.

Wood, Z. (2017, Nov 27th). Mentoring Collaborative Media Projects that Connect Classrooms to Community. Center for Teaching and Learning Online Webinar, Indianapolis, IN.

Wood, Z. (2017, Sept 15th). From the Shadows: Technology Led Mentorship. Presentation presented at Advanced Technology Learning with Technology Symposium, Indianapolis, IN.

Durr, E., Wood, Z., Piekarzewska, A. (2017, July 27th) 3D Digital Preservation of Cultural Dance using Animated Anthropology. Poster presented at 2017 Center for

Research and Learning Student Summer Poster Symposium. Indianapolis, In.

Wood, Z. (2017, June 16th). Medical Applications of 3D Animation: Lessons of Interdisciplinary Collaboration. Presented at the IU School of Medicine Surgery Departments Education Board. Indianapolis, IN.

Wood, Z. (2017, May 24th). Digital Design Methodologies. Presented at the IU School of Medicine IU Maker Health Faire. Indianapolis, IN.

Wood, Z. (2017, March 24th). 3D Scanning and Mixed Realities. Participatory Heritage Colloquium presented at the School of Informatics and Computing Research and Creativity Horizons, Indianapolis, IN.

Wood, Z. (2017, March 10th). 3D Scanning and Mixed Realities. Presented at the School of Informatics and Computing Research and Creativity Horizons, Indianapolis, IN.

Regional

Wood, Z., (2018, March 15th). Medical Applications in Digital Design. Presentation. Presentation at Department of Biomedical & Health Information Science, the University of Illinois at Chicago. Chicago, Illinois.

Wood, Z., (2018, March 8-9th). Virtual Bethel | Preserving and sharing an Indianapolis Legacy. Presentation at 3D/VR Creation and Curation in Higher Education Colloquium (CLIR). University Libraries, University of Oklahoma. Norman, Oklahoma.

Wood, Z., Mayall, Connor, L., Stargrove, R. (2017, June 6th). Problem Solving Across Industry Lines: Lessons for Interdisciplinary Learning. Panel discussion at the Formlabs FUSE Conference, Massachusetts Institute of Technology (MIT), Boston, Massachusetts.

International

Cooper, S. L., Wood, Z., Mayall, H., Renshaw, S., Vaden, V., Brown, L., Burba, J. L., & Henry, A. (2018, February). Augmented reality with 3D print technology in a musculoskeletal workshop. Poster presented at the 2018 Society of Teachers of Family Medicine Conference on Medical Student Education, Austin, TX.

Cooper, S. L., Wood, Z., Mayall, H. J., Renshaw, S. E., & Vaden, V. (submitted). Lessons learned with the development of creating augmented reality with 3d print technology for enhanced learning in a medical school environment. Best Practices submitted to the E-Learn 2017: World Conference on E- Learning, Vancouver, BC (2017, November)

Cooper, S. L., Wood, Z., Henry, A., Renshaw, S., Vaden, V., & Brown, L. (2017, May). Applications of augmented reality in a clerkship experience. Discussion/Lecture presented at the 2017 Information Technology in Academic Medicine Conference,

Association of American Medical Colleges, Atlanta, GA.

Cooper, S. L., Wood, Z., Mayall, H., Renshaw, S. E., Vaden, V., Burba, J. L., & Henry, A. (2017, February). Augmented reality with 3D print technology in a musculoskeletal workshop. Works in Progress presented at the 2017 Society of Teachers of Family Medicine Conference on Medical Student Education, Anaheim, CA.

Mayall, H., Cooper, S., Renshaw, S., Wood, Z., Holley, M., Vaden, V., & Lee, S. (2016, November). Using Augmented Reality with 3D Print Technology in a Medical School Environment. Roundtable Discussion to be presented at E-Learn 2016 -- World Conference on E-Learning to be held in Washington, DC, United States, November 14-16, 2016.

Mayall, H., Cooper, S., Renshaw, S., Wood, Z., Holley, M., Vaden, V., & Lee, S. (2016, October). Enhancing medical student learning through augmented reality with 3D print. Roundtable Discussion to be presented at the 2016 Association for Educational Communications and Technology International Convention, Las Vegas, NV.

MAS Faculty Grants (16'-19')

Name + Role	Agency + Date	Title	Amount	Role
Albert William (lecturer)	School of Informatics June 2019	Curriculum Enhancement Fellowship	\$5500	PI
	Scientific Applications International Corp Jan 2019	<i>3D Threat Detection using Virtual-Environment Assisted Deep Network Trainin</i>	\$100,000	Co-PI
	New Frontiers of Creativity and Scholarship award Feb 2017	Bethel AME VR	\$59,043	Co-PI
	IUPUI VR Bicentennial Grant June 2017	IUPUI VR Tour	\$35,000	Co-PI
	Office of Naval Research May 2016	<i>3D Visualization of RF Signals in (EW) to Enhance Warfighter Training</i>	\$237,000	Co-PI
	IUPUI Center for Teaching and Learning Mar2019	Service Learning Assistantship Grant	\$1800	PI
	IUPUI Center for Teaching and Learning Mar2018	Service Learning Assistantship Grant	\$1800	PI
	IUPUI Center for Teaching and Learning Mar2017	Service Learning Assistantship Grant	\$1800	PI
	IUPUI Center for Teaching and Learning Mar2016	Service Learning Assistantship Grant	\$2250	PI
C. Thomas	IUPUI IAHI	Creating	\$30,000	(Co-PI)

Lewis (lecturer)		Films...Opioid		
	IU New Frontiers	Participatory Filmmaking	\$44,384	PI
	IAHI	Participatory Filmmaking	\$5,000	PI
Zebulun M. Wood - (lecturer)	NIH R61/33 (2019)	VR Social Perspective Taking	\$1,200,000	Co-PI
	IU Sports Innovation Institute (2018)	3D Design Sports Helmet	\$20,000	Co-I
	IUPUI Welcoming Grant (2018)	Gamers Hall, LoL HSI Tournament	\$5,000	Faculty Sponsor
	IUPUI VR Bicentennial Grant + Welcoming Grant June 2017	IUPUI VR Tour	\$35,000	Co-PI
	New Frontiers of Creativity and Scholarship award Feb 2017	Bethel AME VR	\$59,043	Co-PI
	IU Collaborative Research Grant (2017)	VR to Assess Anger	\$60,480	Co-PI
	IUPUI Curriculum Enhancement Grant (2016)	AR Medical Education Applications Prototyping	\$10,000	Co-PI
	IUPUI UROP (2018)	Lidar Polish Castle	\$500	Advisor
	IUPUI UROP (2017)	Motion Capture Polish Dance	\$500	Advisor
	IUPUI MURI	Project Meta	\$20,200	Advisor

	(2016)			
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Publications/News/Media

<https://soic.iupui.edu/news/lewis-opioid-epidemic-film/> (2019)
<https://soic.iupui.edu/news/mosaic-fellowship-shelton/> (2019)
<https://soic.iupui.edu/news/gaming-student-best-in-show/> (2019)
<https://soic.iupui.edu/news/nih-virtual-reality-odd/> (2019)
<https://news.iu.edu/stories/2019/05/iupui/jagnews/08-virtual-reality-game-bluewall-vr.html>
(2019)
<https://50.iupui.edu/faces/features/nelsen-jordan.html> (2019)
<https://news.iu.edu/stories/2019/05/iupui/jagnews/01-safer-football-helmet-liner-cellular-design.html> (2019)
<https://soic.iupui.edu/news/james-ward-animator-oscar/> (2019)
<https://soic.iupui.edu/news/digital-humanities-research-methods/> (2019)
<https://soic.iupui.edu/news/revamped-masters-level-mas-program-prepares-grads-for-workforce/>
(2019)
<https://soic.iupui.edu/news/greece-study-abroad-2018/> (2018)
<https://soic.iupui.edu/news/mas-students-siggraph-ar/> (2018)
<https://news.iu.edu/stories/2018/04/iupui/inside/12-whats-in-your-bag-herron-senior-creates-prosthetic-designs.html> (2018)
<https://news.iu.edu/newsletters/inside-iupui/2018/04-12.html> (2018)
<https://soic.iupui.edu/news/nelsen-palfi-top-100/> (2018)
<https://soic.iupui.edu/news/mas-alumni-tribeca-film-fest/> (2018)
<https://soic.iupui.edu/news/mas-alumni-matchbook-creative/> (2018)
<https://soic.iupui.edu/news/mas-students-heartland-film-fest/> (2018)
<https://news.iu.edu/stories/2017/12/iupui/inside/14-fall-capstone.html> (2017)
<https://news.iu.edu/stories/2017/11/iupui/inside/30-advanced-visualization-lab.html> (2017)
<https://news.iu.edu/stories/2017/11/iupui/releases/16-digital-artificial-facial-parts.html> (2017)
<https://soic.iupui.edu/news/mobile-app-competition-2017/> (2017)
<https://news.iu.edu/stories/2017/10/iupui/releases/05-bethel-ame-church-digital-re-creation.html>
(2017)
<https://news.iu.edu/stories/2017/08/iupui/inside/18-3d-digital-archiving.html> (2017)
<https://soic.iupui.edu/news/jacobs-research-award/> (2017)
<https://soic.iupui.edu/news/2017-top-100/> (2017)
<https://soic.iupui.edu/news/grant-preserving-church-heritage/> (2017)
<https://soic.iupui.edu/news/2016-app-challenge/> (2016)
<https://soic.iupui.edu/news/lewis-heartland-film-festival/> (2016)
<https://soic.iupui.edu/news/navy-research-grant/> (2016)
<https://soic.iupui.edu/news/youtube-gaming-series/> (2016)
<https://soic.iupui.edu/news/student-film-under-the-bridge/> (2016)
<https://soic.iupui.edu/news/greece-trip-2016/> (2016)
<https://soic.iupui.edu/news/top-10-student-mineart/> (2016)
<https://blogs.iu.edu/innovate/2016/10/20/indiana-university-school-of-dentistry-a-history-of-innovation/> (2016)
<https://soic.iupui.edu/news/zeb-wood-3d-prosthetic/> (2016)

<http://archive.inside.iu.edu/editors-picks/technology/2016-02-24-shirley-anderson.shtml> (2016)
<https://itnews.iu.edu/articles/2016/avl-and-iu-school-of-dentistry-create-digital-prosthodontics-workflow.php> (2016)
<https://soic.iupui.edu/news/award-winning-student-creating-game-for-kids-with-diabetes/> (2016)

b. Goals in maintaining and scaling effectiveness of our lecturer rank and research ability and marketing within the Media Arts and Sciences program

1.Promote faculty to Senior Lecturer and Teaching Professors Ranks

- i. Increase focus of Scholarship of Teaching energy with undergrad faculty
- ii. Maintain energy of research and creative activities with undergrad faculty

i. Assessment =

- a. # of promoted lecturer rank
- b. # of SoTL grants
- c. # of Creative Activity Grants
- d. # of Research Grants

2.Increase 4+1 and MAS Master's Program Enrollment

- i. Increase # TT MAS faculty
- ii. Increase # of MAS faculty led Research Grants

i. Assessment =

- a. Reach (20-30) MAS grad students
- b. # of SoTL grants
- c. # of Creative Activity Grants
- d. # of Research Grants
- e. # of TT rank hires

3.Increase focus on commercialization incentives with faculty who are already engaged in innovations on campus.

i. Assessment =

- a. # of commercial partnerships
- b. # of products created with students that live beyond course
- c. # of patents created

Co-Curricular Experiences create a culture far outside in the Media Arts and Science Classroom. Media Arts and Science faculty support study one study abroad and several very active student groups. Through student group activity our faculty and student leaders connect membership to career leads, local and national level networking in many domains of Media Arts and Science

4. **Moving Forward:** Scale # of Study Abroad Offerings from within Media Arts and Science including Hoosier in Hollywood program cities.

Study Abroad | Paros Greece

<https://soic.iupui.edu/undergraduate/greece-study-abroad/>



Documenting Historical Cultural Artifacts and Traditions in Paros, Greece

This is an international service-learning course that takes place on the Greek island of Paros. Service projects will include, but are not limited to:

- Producing promotional videos for local tourism; documentary videos of disappearing island lifestyles, cultural and archeological sites; producing 3D graphical recreations of archeological locations.
- Classroom work will include work on documenting cultural artifacts and historical sites, strategies for the local service-learning projects and review of work in progress.
- Classroom experiences will be supplemented by required afternoon or evening field trips to experience museums, churches, archeological sites, contemporary art galleries, and cultural events on Paros.
- Working with local residents, Innovaros and <http://www.Parosweb.com>

Up to date projects made by MAS faculty and students as well as trip information can be found on the facebook community site: <https://www.facebook.com/SOICGreece2015/>

Student Group Involvement

Media Arts and Science faculty pride themselves on creating a culture within the School of Informatics and Computing that facilitates inclusion and co-curricular project-based learning where their students can begin building professional networks with industry partners. Many of our student groups facilitate early professional development across all of our MAS BS specializations in the form of co-curricular projects, industry lectures, studio visits, and attending conferences. Several faculty integrate student groups centered on MAS specializations into local, regional, and national conferences.

Media Arts & Science Led Student Groups

ACM SIGGRAPH

SIGGRAPH IUPUI Student Chapter is dedicated to furthering the knowledge, excitement, and creativity of its members. Typically members are interested in graphics, interactive techniques, or computer animation.

Contact: [facebook.com/SIGGRAPH](https://www.facebook.com/SIGGRAPH)

Concept Art Society

A place where concept artists can come together and learn art in an inspiring environment.

Contact: [facebook.com/ConceptArtSociety](https://www.facebook.com/ConceptArtSociety)

Cosplay Club at IUPUI

The IUPUI Cosplay Club is dedicated to the creation and discussion of costumes and prop making. Members can come to work on their projects, meet others with a passion for cosplay, pick up a few tips, or just hang out.

Contact: [facebook.com/groups/iupuicosplay/](https://www.facebook.com/groups/iupuicosplay/)

Game Developer's Group

This group is for dedicated students who want to advance their skills in game development with hands-on exposure to the medium.

Meetings are focused on learning, creating, and critiquing. Contact: [facebook.com/GameDevIUPUI](https://www.facebook.com/GameDevIUPUI)

Gamers' Hall at IUPUI

The Gamers Guild at IUPUI is a place where you can kick back, relax, and enjoy some gaming to take a break from your stressful academic life. No fees, no requirements to attend, just fun.

Contact: <https://www.facebook.com/groups/GamersHall/>

Informatics & Computing Student Council (ICSC)

Informatics Student Government (ICSC) is the governing organization for student clubs and activities within the School of Informatics and Computing. It is comprised entirely of students. Contact: www.iupui.edu/~isg/

MacGuffin Media (MacMedia)

MacGuffin Media (MacMedia) is an IUPUI student organization dedicated to providing any and all students with the opportunity to become involved in the various aspects of media,

including (but not limited to): Film Production, Audio, 3D, Scriptwriting, etc.
Contact: [facebook.com/MacMediaIUPUI](https://www.facebook.com/MacMediaIUPUI)

Web Developers Group

The Mobile App Developers organization at IUPUI's primary purpose is to facilitate and promote a community of mobile application developers at IUPUI. Members will gain hands-on experience working in the app development pipeline. Facets of development include programming, design, asset creation, and quality assurance testing. No experience is required to join.

Contact:

STARS (Students & Technology in Academia, Research, and Services) The mission of the STARS Alliance is to increase the participation of women, underrepresented minorities and people with disabilities in computing disciplines through multi-faceted interventions

Contact: facebook.com/groups/IUPUIStars/ Vicki Daugherty-vdaugher@iupui.edu

Women in Technology (WiT)

Women in Technology (WiT) is dedicated to improving the community by empowering women from all disciplines to utilize technology to make a difference.

Contact: www.iupui.edu/~getwit

Media Arts and Science Scholarships

Since 2016, Media Arts and Science and the SoIC has raised the number of scholarships offered to its students. MAS, in particular, has seven in school scholarships up from three in 2016.

Scholarship/ Fellowship	Amount	GPA	Description
Major-Specific			
Media Arts and Science oriented Scholarships			
Tyler R. Stull Memorial Scholarship	\$1,500, not renewable	3.0	Awarded to an undergraduate student of senior standing majoring in Media Arts and Science. The student must demonstrate significant talent and future career potential
The OfficeWorks/Tom O'Neill Scholarship	\$1,000, not renewable	3.5	This is awarded to an undergraduate student of senior standing majoring in Media Arts and Science. Special consideration will be given to underrepresented students, including but not limited to financially challenged students and students of Hispanic background.
Dean's Advisory Council	\$1,000, not renewable	3.5	The student must have a record of innovation, community service, or academic excellence.
John R. Gibbs Scholarship	\$1,000, not renewable	3.5	The student must have a record of innovation, community service, or academic excellence.
Make your Mark Scholarship	\$1,000, not renewable	3.0	Must have participated in at least one semester of internship, experiential learning, mentoring, or professional development.

Perseverance Scholarship	\$750/year	Any	Demonstrate success during a challenging life event—or upon returning to the School of Informatics and Computing after enduring a difficult life event.
RJE Knoll Internship Scholarship	\$400/semester not renewable	3.0	The student must have arranged a for-credit internship. <ul style="list-style-type: none"> ▪ Completion of the following courses:Media Arts and Science Majors: N100, N101, N102, N202, N299 ▪ Completed Credit Internship Application, signed by an employer and approved by the Career Services office.
IUPUI Media Arts and Science Capstone for Social Change Scholarship	\$600/year not renewable	Any	benefit at least one senior who is selected among competing capstone project ideas