

BDSI-PhD Curriculum

Area 1 - Biomedical Informatics Foundations and Applications - 15-16 hours

Research Foundations - Choose 1			
3 CLEM	HLTH 8210	Health Research 1: Design and Measurement	
3 MUSC	HIN 708	Applied Statistical and Research Methods	
3 MUSC	DHA 805	Qualitative Methods	
Biomedical Informatics Foundations - Both			
3 MUSC ¹	BDSI 701/ 8010	Intro to Biomedical Informatics	
3 MUSC ²	BDSI 702/8020	Biomedical Data Standards and Terminologies	
Track Specific Course - Choose 1			
3 MUSC ³	BDSI 711/8110	Precision Medicine Informatics	
3 MUSC ⁴	BDSI 712/8120	Clinical and Translational Informatics	
3 CLEM	HLTH 8900	Population Health Informatics	
3 CLEM	HLTH 8900	Clinical Decision Support Systems	
BDSI Electives - Choose 1-2 (minimum 3 hours)			
3 CLEM	CPSC 8450	Bioinformatics Algorithms	
2 MUSC	BMTRY 783	Statistical Methods for Bioinformatics	
3 MUSC	NEW BMI	Panomics	
2 MUSC	NEW BMI	Consumer and Quantified Self	
2 MUSC	BDSI 732	Health Enterprise Analytics	
2 MUSC	BDSI 731	Microbiome Informatics	
3 MUSC	BDSI 775	Systematic and Scoping Reviews	

Area 2 – Computing, Math, Stats, and Engineering - 18 hours

Systems and Data Base Management - Choose 2			
3 CLEM	CPSC 6620	Database Management System	Data Management Tools and Technology
3 CLEM	CPSC 8620	Database Management System Design	
3 CLEM	CPSC 8470	Introduction to Information Retrieval	Computing Environments
3 MUSC	HIN 700	Database Management	
3 CLEM	CPSC 6550	Computational Science: Methods & Software Systems	
3 CLEM	ECE 6780	General Purpose Computation on GPUs	
3 CLEM	ECE 8780	High-Performance Computing with GPUs	
3 CLEM	CPSC 8200	Parallel Architectures	Human Factors/HCI/Usability
3 CLEM	ECE 6730	Introduction to Parallel Systems	
3 CLEM	CPSC 8490	Principles of Scientific Computing	
3 CLEM	CPSC 6140	Human and Computer Interaction	
3 CLEM	HCC 8310	Fundamentals of Human-Centered Computing	
3 CLEM	IE 6880	Human Factors Engineering	Applied Software Engineering
3 CLEM	IE 8000	Human Factors Engineering	
3 CLEM	CPSC 8710	Foundations of Software Engineering	
3 CLEM	CPSC 8700	Software Design	
Math - Choose 1			
3 CLEM	MATH 8050	Data Analysis	
3 CLEM	STAT 8010	Statistical Methods	
4 MUSC	BMTRY 700	Introduction to Clinical Biostatistics	

¹	MUSC students will register for 701; Clemson students will register for 8010
²	MUSC students will register for 702; Clemson students will register for 8020
³	MUSC students will register for 711; Clemson students will register for 8110
⁴	MUSC students will register for 712; Clemson students will register for 8120
⁵	MUSC students will register for 721; Clemson students will register for 8210
⁶	MUSC students will register for 700; Clemson students will register for 8000
⁷	MUSC students will register for 720; Clemson students will register for 8880
⁸	Clemson students will register their dissertation hours under the course prefix of their advisor's home department, with course number 9910

Area 2 (continued) – Computing, Math, Stats, and Engineering - 18 hours

Machine Learning/Data Science - Choose 1				
3	CLEM	CPSC 6420	Artificial Intelligence	
3	CLEM	CPSC 6430	Machine Learning: Implementation and Evaluation	
3	CLEM	CPSC 8420	Advanced Machine Learning	
3	CLEM	CPSC 6300	Applied Data Science	
3	MUSC ⁵	BDSI 721/8210	Applied Machine Learning	
Other - Choose 2				
3	CLEM	STAT 8190	Biostatistics	Biostatistics
3	CLEM	HLTH 8310	Quantitative Analysis in Health Research I	Data Mining
4	MUSC	BMTRY 701	Biostatistical Methods II	
3	CLEM	STAT 6020	Introduction to Statistical Computing	
3	CLEM	CPSC 8650	Data Mining	
3	CLEM	ECE 8560	Pattern Recognition	
3	CLEM	CPSC 8480	Network Science	Visualization and Exploratory Data Analysis
3	CLEM	MATH 8070	Applied Multivariate Statistical Analysis	
3	MUSC	BMTRY 719	Bayesian Biostatistics	
3	CLEM	CPSC 6030	Data Visualization	
3	CLEM	CPSC 8030	Scientific Visualization	
3	CLEM	CPSC 8430	Deep Learning	Image and Signal Processing
3	CLEM	ECE 6310	Introduction to Computer Vision	
3	CLEM	ECE 6670	Introduction to Digital Signal Processing	
3	CLEM	ECE 8470	Digital Image Processing	
3	CLEM	BIOE 6310/11	Medical Imaging	
3	CLEM	MATH 6410	Introduction to Stochastic Models	Decision Analysis/ Knowledge Integration/ Modeling
3	CLEM	ECE 6420	Knowledge Engineering	Geospatial Analysis
3	CLEM	IE 8030	Engineering Optimization and Applications	
3	CLEM	PADM 8420	GIS for Public Administrators	
3	MUSC	DPHS NEW	GIS and Mapping for Public Health	
3	CLEM	CPSC 8400	Design & Analysis of Algorithms	
3	CLEM	CPSC 8380	Advanced Data Structure	Algorithms and Data Structures
3	MUSC	BDSI 722	Clinical Natural Language Processing	Natural Language Processing

Area 3 - Population Health, Health Systems, and Policy - 5-6 hours

Choose 2 - Course Titles Must Be Different			
3 CLEM	HLTH 8110	Health Care Delivery Systems	Health Systems
3 CLEM	HLTH 8020	Health Economics	
3 MUSC	DHA 807	Managing Healthcare Information	Health Policy
3 MUSC	HAP 704-02	Health Policy	
3 CLEM	HLTH 8100	Health Policy	Quality and Safety
2 CLEM	HLTH 8140	Health Systems Quality Improvement	
3 MUSC	HAP 632-02	Quality Management of Health Services	
3 MUSC	HAP 735-02	Health Law and Risk Management	Ethical, Legal, and Social Issues; Privacy and Security
3 MUSC	HIN 716	Informatics	
2 CLEM	HLTH 8130	Population Health and Research	Population Health
3 CLEM	HLTH 8090	Epidemiology	
3 MUSC	BMTRY 736	Foundations of Epidemiology I	
3 MUSC	BMTRY 747	Foundations of Epidemiology II	
3 MUSC	DHA 850	Population Health Management	
3 CLEM	HLTH 8900	Clinical Decision Support Systems	
3 MUSC	BMTRY 738	Field Epidemiology I	

Area 4 - Domain Biology/Medicine - 3-4 hours

Choose 1			
4 MUSC	CGS 766	Genes: Inheritance and Expression	Foundations of Biomedical Science
3 MUSC	CGS 767	Cells: Organization and Communication	
3 CLEM	PHYS 8190	Computational Biophysics	
3 CLEM	MICRO 8130	Practical Bioinformatics for Microbiologists	
3 CLEM	BIOE 8010	Concepts in Molecular, Cellular and Dev. Bio	
3 CLEM	BIOE 8000	Concepts in Evolution, Ecology and Organismal Bio	Biochemistry and Pathology
3 CLEM	GEN 6400	Bioinformatics	
3 CLEM	BIOE 8460	Biomedical Basis for Engineered Replacement	
3 CLEM	BCHM 6360	Molecular Biology: Genes to Proteins	
3 CLEM	BCHM 6430	Molecular Basis for Disease	
3 CLEM	BCHM 8140	Advanced Biochemistry	Genetics
3 CLEM	GEN 6700	Human Genetics	
3 CLEM	MATH 9810	Statistical Genetics	
3 CLEM	GEN 8900	Introduction to Quantitative Genetics	
3 CLEM	GEN 8140	Advanced Genetics	
3 CLEM	GEN 6200	Molecular Genetics and Gene Regulation	Genomics
3 CLEM	GEN 6100	Population & Quantitative Genetics	
3 CLEM	GEN 6050	Molecular Genetics of Eukaryotes	
3 CLEM	BIOE 6030	Introduction to Applied Genomics	
3 CLEM	HCG 9150	Principles of Pharmacogenomics	
3 CLEM	CHE 8450	Systems Biology and Pharmacology	
3 CLEM	GEN 8450	Advanced Medical Bioinformatics	
3 CLEM	GEN 8200	Genomics and Proteomics	Regulatory Genomics
3 CLEM	GEN 8060	Molecular Diagnostics and Pathogen Genomics	
3 CLEM	GEN 8900	Regulatory Genomics	

Area 5 - Seminars/Lab Rotations/Research Hours - 26 hours

Seminars - 4 hours			
1	BDSI 700/8000 ⁶	Seminar	
1	BDSI 700/8000	Seminar	
1	BDSI 700/8000	Seminar	
1	BDSI 700/8000	Seminar	
Lab Rotations - 4 hours			
2	BDSI 720/8880 ⁷	Lab Rotation	
2	BDSI 720/8880	Lab Rotation	
Research Hours - 18 hours			
3	BDSI 970/90 ⁴	Dissertation Research	
3	BDSI 970/90	Dissertation Research	
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