MATHEMATICS AND COMPUTER SCIENCE (BS) (COLLEGE OF COMPUTING AND DIGITAL MEDIA)

The BS in Mathematics and Computer Science is designed to prepare students to compete for the more intellectually demanding jobs in software development or for graduate study in various areas of computer science and applied mathematics such as theoretical computer science, graphics, data analysis, artificial intelligence, and computational methods.

Program Requirements	Quarter Hours
Liberal Studies Requirements	76
Major Requirements	88
Open Electives	28
Total hours required	**192**

Learning Outcomes

Students will be able to:

- Construct valid, logical arguments and analyze the reasoning of others.
- Model a computation problem, select appropriate algorithms and data structures for a solution, justify the correctness of the algorithm, and implement an application solving the problem.
- Use discrete and continuous mathematical structures to model problems and then solve them using appropriate techniques.
- Analyze the efficiency of a computational solution mathematically, and validate the analysis experimentally.

Liberal Studies Requirements

Honors program requirements can be found in the individual Colleges & Schools section of the University Catalog. Select the appropriate college or school, followed by Undergraduate Academics and scroll down.

First Year Program		Hours
Chicago Quarter		
LSP 110 or LSP 111	DISCOVER CHICAGO or EXPLORE CHICAGO	4
Focal Point		
LSP 112	FOCAL POINT SEMINAR	4
Writing		
WRD 103	COMPOSITION AND RHETORIC I [1]	4
WRD 104	COMPOSITION AND RHETORIC II [1]	4
Quantitative Reasoning		
Not Required		
Sophomore Year		
Race, Power, and Resistance		
LSP 200	SEMINAR ON RACE, POWER, AND RESISTANCE	4
Junior Year		
Experiential Learning		
Required		4
Senior Year		
Capstone		
Required in major [1]		

[1] Students must earn a C- or better in this course.

Learning Domains

Arts and Literature (AL) (https://catalog.depaul.edu/undergraduate-core/liberal-studies-program/liberal-studies-learning-domains/arts-and-literature/)
- 3 Courses Required

Historical Inquiry (HI) (https://catalog.depaul.edu/undergraduate-core/liberal-studies-program/liberal-studies-learning-domains/historical-inquiry/)
- 2 Courses Required

Math and Computing (MC) (https://catalog.depaul.edu/undergraduate-core/liberal-studies-program/liberal-studies-learning-domains/math-and-computing/)
- Not Required

Philosophical Inquiry (PI) (https://catalog.depaul.edu/undergraduate-core/liberal-studies-program/liberal-studies-learning-domains/philosophical-inquiry/)
- 2 Courses Required (See note below)

Religious Dimensions (RD) (https://catalog.depaul.edu/undergraduate-core/liberal-studies-program/liberal-studies-learning-domains/religious-dimensions/)
- 2 Courses Required (See note below)

Scientific Inquiry (SI) (https://catalog.depaul.edu/undergraduate-core/liberal-studies-program/liberal-studies-learning-domains/scientific-inquiry/)
- 1 Lab Course Required

Social, Cultural, and Behavioral Inquiry (SCBI) (https://catalog.depaul.edu/undergraduate-core/liberal-studies-program/liberal-studies-learning-domains/social-cultural-and-behavioral-inquiry/)
- 3 Courses Required:

Notes

Students must take one of the following ethics courses:

Course	Title	Quarter Hours
Select one of the following:		4
CSC 208	ETHICS IN TECHNOLOGY (PI)	
PHL/MGT 248	BUSINESS ETHICS (PI)	
REL/MGT 228	BUSINESS, ETHICS AND SOCIETY (RD)	

Specified required courses within Liberal Studies may have grade minimums (e.g. C- or better). Please consult your advisor or your college and major requirements.

Courses offered in the student's primary major cannot be taken to fulfill LSP Domain requirements. If students double major, LSP Domain courses may double count for both LSP credit and the second major. Students who choose to take an experiential learning course offered by

the major may count it either as a general elective or as the Experiential Learning requirement.

Students with a primary major in Mathematics and Computer Science (joint degree) are required to complete one of the following Capstone courses: CSC 394, DSC 394, or MAT 398. Students double majoring or pursuing dual degrees with the primary major or primary degree in Mathematics and Computer Science (joint degree) are also required to complete one of these courses. Mathematics and Computer Science (joint degree) students in the University Honors Program shall take the University Honors Capstone. They are not expected to take both the Honors Capstone and the primary major or primary degree Capstone.

In meeting learning domain requirements, no more than one course that is outside the student's major and is cross-listed with a course within the student's major, can be applied to count for LSP domain credit. This policy does not apply to those who are pursuing a double major or earning BFA or BM degrees.

Major Requirements
Course Requirements

Course	Title	Quarter Hours
CSC 241	INTRODUCTION TO COMPUTER SCIENCE I [1]	4
CSC 242	INTRODUCTION TO COMPUTER SCIENCE II [1]	4
CSC 300	DATA STRUCTURES I	4
CSC 301	DATA STRUCTURES II	4
CSC 321	DESIGN AND ANALYSIS OF ALGORITHMS	4
CSC 373	COMPUTER SYSTEMS I	4
CSC 374	COMPUTER SYSTEMS II	4
MAT 140	DISCRETE MATHEMATICS I	4
MAT 141	DISCRETE MATHEMATICS II	4
or MAT 215	INTRODUCTION TO MATHEMATICAL REASONING	
MAT 260	MULTIVARIABLE CALCULUS I	4
MAT 262	LINEAR ALGEBRA	4
Select one of the following calculus sequences:		12
Calculus Sequence (option 1)		
MAT 147	CALCULUS WITH INTEGRATED PRECALCULUS I	
MAT 148	CALCULUS WITH INTEGRATED PRECALCULUS II	
MAT 149	CALCULUS WITH INTEGRATED PRECALCULUS III	
Calculus Sequence (option 2)		
MAT 150	CALCULUS I	
MAT 151	CALCULUS II	
MAT 152	CALCULUS III	
Summer Calculus Sequence (option 3)		
MAT 155	SUMMER CALCULUS I	
MAT 156	SUMMER CALCULUS II	
MAT 149	CALCULUS WITH INTEGRATED PRECALCULUS III	
or MAT 152	CALCULUS III	
Select One of the Following (Capstone)		4
CSC 394	SOFTWARE PROJECTS	
DSC 394	DATA SCIENCE PROJECT	
MAT 398	SENIOR CAPSTONE SEMINAR	
Select twelve (12) credit hours of CDM Major Electives		12
Select twelve (12) credit hours of MAT Major Electives		12
Select four (4) credit hours of CDM or MAT Major Elective		4

[1] Students with one (1) semester programming experience may take CSC 243 and one (1) additional Major Elective in lieu of CSC 241 and CSC 242.

Major Electives

Students must earn a grade of C- or higher in all major requirements and major elective courses.

For the major electives, it is recommended that students concentrate on one or two areas to achieve depth, but they are not required to do so. Students are strongly encouraged to discuss course selection with an advisor. Students may wish to arrange with a professor to take an independent study or a research experience (MAT 399 (https://catalog.depaul.edu/search/?P=MAT%20399) or CSC 399 (https://catalog.depaul.edu/search/?P=CSC%20399) or IT 300 (https://catalog.depaul.edu/search/?P=IT%20300)) in order to explore a subject more deeply than is possible in a scheduled course.

Theory of Computation
The courses in the theory of computation area explore the mathematical and logical foundations of computer science.

Course	Title	Quarter Hours
CSC 235	PROBLEM SOLVING	
CSC 327	PROBLEM SOLVING FOR CONTESTS	
CSC 333	CRYPTOLOGY	
CSC 344	AUTOMATA THEORY AND FORMAL GRAMMARS	
CSC 347	CONCEPTS OF PROGRAMMING LANGUAGES	
CSC 348	INTRODUCTION TO COMPILER DESIGN	
CSC 358	SYMBOLIC PROGRAMMING	
CSC 376	DISTRIBUTED SYSTEMS	
CSC 389	THEORY OF COMPUTATION	
MAT 216	FOUNDATIONS OF ADVANCED MATHEMATICS	
MAT 302	COMBINATORICS	
MAT 303	THEORY OF NUMBERS	
MAT 305	GRAPH THEORY	
MAT 310	ABSTRACT ALGEBRA I	
MAT 335	REAL ANALYSIS I	
MAT 336	REAL ANALYSIS II	
MAT 349	APPLIED PROBABILITY	
or MAT 351	PROBABILITY AND STATISTICS I	
MAT 370	ADVANCED LINEAR ALGEBRA	
MAT 372		

Computational Methods

The computational methods area investigates quantitative and computational methods in computer science.

Course	Title	Quarter Hours
CSC 331	SCIENTIFIC COMPUTING	
MAT 304	DIFFERENTIAL EQUATIONS	
MAT 330		
MAT 331		
MAT 359	SIMULATION MODELS AND MONTE CARLO METHOD	
MAT 384	MATHEMATICAL MODELING	
MAT 385	NUMERICAL ANALYSIS I	
MAT 386	NUMERICAL ANALYSIS II	

Artificial Intelligence

For students with an interest in the computational relations between syntax and semantics.

Course	Title	Quarter Hours
CSC 357	EXPERT SYSTEMS	
CSC 358	SYMBOLIC PROGRAMMING	
CSC 380	FOUNDATIONS OF ARTIFICIAL INTELLIGENCE	
CSE 375	INTRODUCTION TO ROBOTICS	

Data Science Area

For students who are interested in statistical and computational analysis of data. Many of the courses in this area require the student to take MAT 351-MAT 353.

Course	Title	Quarter Hours
DSC 323	DATA ANALYSIS AND REGRESSION	
or MAT 356	APPLIED REGRESSION ANALYSIS	
DSC 324	ADVANCED DATA ANALYSIS	
or MAT 354		
DSC 333	INTRODUCTION TO BIG DATA PROCESSING	
DSC 341	FOUNDATIONS OF DATA SCIENCE	
DSC 345	MACHINE LEARNING	
DSC 365	DATA VISUALIZATION	
MAT 341	STATISTICAL METHODS USING SAS	
MAT 349	APPLIED PROBABILITY	
or MAT 351	PROBABILITY AND STATISTICS I	
MAT 352	PROBABILITY AND STATISTICS II	
MAT 353	PROBABILITY AND STATISTICS III	
MAT 354		
MAT 355	STOCHASTIC PROCESSES	
MAT 357	NONPARAMETRIC STATISTICS	
MAT 358	APPLIED TIME SERIES AND FORECASTING	
MAT 359	SIMULATION MODELS AND MONTE CARLO METHOD	
MAT 360	GENERALIZED LINEAR MODELS	

Computer Vision

Computer vision studies the mathematical and algorithmic underpinnings of image analysis and image processing.

Course	Title	Quarter Hours
MAT 261	MULTIVARIABLE CALCULUS II	
MAT 335	REAL ANALYSIS I	
MAT 370	ADVANCED LINEAR ALGEBRA	
MAT 381	FOURIER ANALYSIS AND SPECIAL FUNCTIONS	
MAT 384	MATHEMATICAL MODELING	
MAT 387	OPERATIONS RESEARCH: LINEAR PROGRAMMING	
MAT 388	OPERATIONS RESEARCH: OPTIMIZATION THEORY	
CSC 381	INTRODUCTION TO DIGITAL IMAGE PROCESSING	
CSC 382	APPLIED IMAGE ANALYSIS	

Research

Course	Title	Quarter Hours
CSC 395	RESEARCH COLLOQUIUM	
CSC 399	INDEPENDENT STUDY	
MAT 390	MATHEMATICS READING AND RESEARCH	
MAT 396	SENIOR THESIS RESEARCH	

Finance

Course	Title	Quarter Hours
MAT 349	APPLIED PROBABILITY	
MAT 368	MATHEMATICS FOR FINANCE	
MAT 387	OPERATIONS RESEARCH: LINEAR PROGRAMMING	
MAT 388	OPERATIONS RESEARCH: OPTIMIZATION THEORY	

Open Electives

Open Elective credit hours are required to meet the minimum graduation requirements of 192 hours. Open Electives may be taken from any unit at DePaul.

See www.cdm.depaul.edu *(*http://www.cdm.depaul.edu*) to see sample schedule of course requirements on a year-by-year basis.*

Degree Requirements

Students in this degree must meet the following requirements:

- Complete a minimum of 192 credit hours (generally 48 courses)
- Earn a grade of C- or higher in WRD 103, WRD 104, and all Major and Minor courses
- Earn a grade of D or higher in all other Liberal Studies and Open Elective courses
- Maintain a cumulative GPA of 2.0 or higher

Program Combination Restrictions

Students pursuing the BS in Mathematics and Computer Science are forbidden from pursuing the following secondary/double majors: BS Computer Science (all concentrations); BS Game Programming; BS Information Technology.

Students pursuing the BS in Mathematics and Computer Science are also forbidden from pursuing the Minor in Computer Science and the Minor in Information Technology.