

# MATHEMATICAL, INFORMATION, AND COMPUTER SCIENCES

POINT LOMA  
NAZARENE  
UNIVERSITY  
DEPARTMENT OF

Maria R. Zack, Ph.D., Chair ■ Rohr Science Hall ■ 619.849.2458

## MISSION STATEMENT

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The Mathematical, Information, and Computer Sciences Department at Point Loma Nazarene University is committed to maintaining a curriculum that provides its students with the tools to be productive, the passion to continue learning, and Christian perspectives to provide a basis for making sound value judgments.

## OBJECTIVES

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1. To prepare students for:
  - careers that use mathematics, computer science and information systems in business, industry or government.
  - graduate study in fields related to mathematics, computer science, and information systems.
  - teaching mathematics and computer science at the secondary level.
2. To prepare students to apply their knowledge and utilize appropriate technology to solve problems.
3. To educate students to speak and write about their work with precision, clarity, and organization.
4. To help students gain an understanding of, and appreciation for, the historical development, contemporary progress, and societal role of mathematics, information systems, and computer science.
5. To integrate the study of mathematics, information systems and computer science with the Christian liberal arts.

## TRADITION OF EXCELLENCE...

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The Department of Mathematical, Information, and Computer Sciences features a highly skilled team of professors who share their wealth of knowledge with students both in and out of the classroom. The personal attention of the faculty and innovative learning environment help students to comprehend concepts in mathematics, information systems, and computer science. The accomplished faculty also conducts research with current students. Recently, topics have included random number generation, music and graph theory,

statistics, stereo vision using genetic algorithms, artificial intelligence, and computer architecture. These types of research opportunities provide experience with modern technology and current real-world applications.

## CAREER OPPORTUNITIES...

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Students who graduate with a degree from the Department of Mathematical, Information, and Computer Sciences are prepared to succeed. Students have chosen careers in actuarial science, industrial engineering, information science, applied mathematics, statistics, espionage, teaching, software engineering, project management, and systems analysis.

## MAJORS AND MINORS

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### *Majors*

Computer Science (B.S. and B.A.)  
Information Systems (B.S.)  
Mathematics (B.S. and B.A.)

### *Minors*

Computer Science  
Information Systems  
Mathematics

## FACULTY

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Lorinda J. Carter, Ph.D.  
*University of California, San Diego*

Gregory D. Crow, Ph.D.  
*University of Notre Dame*

Donald S. Evans, B.S.  
*Stanford University*

Jesús Jiménez, Ph.D.  
*University of Utah*

Jeffrey L. McKinsty, Ph.D.  
*University of California, San Diego*

Sheldon O. Sickler, Ph.D.  
*University of California, Los Angeles*

David L. Strawn, Ph.D.  
*University of Minnesota*



Bradley S. Whitaker, M.A.  
*Teachers College, Columbia University*

Maria R. Zack, Ph.D., Chair  
*University of California, San Diego*

## Computer Science (B.S.)

MAJOR

### LOWER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
CSC 132	Intro to Computer Science	.2
CSC 142	Intro to Computer Programming	.2
CSC 154	Fundamentals of Computer Science	.4
CSC 254	Data Structures and Algorithms	.4
MTH 164	Calculus I	.4
MTH 174	Calculus II	.4
	TOTAL	.20

### UPPER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
CSC 314	Operating Systems	.4
CSC 324	Software Engineering	.4
CSC 354	Algorithm Analysis and Theory of Computation	.4
CSC 394	Programming Languages	.4
CSC 454	Computer Architecture and Assembly Language	.4
CSC 481	Senior Seminar in Comp. Science	.1
CSC 494	Senior Software Project	.4
MTH 344	Discrete Mathematics	.4
<i>14 additional units chosen from:</i>		
CSC 334	Artificial Intelligence	.4
CSC 374	Computer Networks and Parallel Processing	.4
CSC 414	Topics in Computer Science	.4
CSC 491	Independent Study in Computer Science	.1-4
ISS 413	Data Base Management Systems	.3
ISS 422	Internet Applications Development	.2
ISS 472	Internship In Information Systems	.2
MTH 203	Introduction to Statistics *	.3
MTH 232	Linear Algebra	.2
MTH 274	Calculus III	.4
MTH 312	Advanced Linear Algebra	.2
MTH 334	Applied Mathematics	.4
MTH 364	Mathematical Statistics *	.4
MTH 372	Numerical and Symbolic Computation	.2
HON 498	Honors Seminar I	.2
HON 499	Honors Seminar II	.1
	TOTAL	.43

\* *Only one of these two courses may apply as a CS elective, not both.*

## Computer Science (B.A.)

MAJOR

### LOWER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
CSC 132	Intro to Computer Science	.2
CSC 142	Intro to Computer Programming	.2
CSC 154	Fundamentals of Computer Science	.4
CSC 254	Data Structures and Algorithms	.4
MTH 164	Calculus I*	.4
MTH 174	Calculus II*	.4
	TOTAL	.17-20

\* *MTH 144 and MTH 131 may substitute for the sequence MTH 164 and MTH 174*

### UPPER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
CSC 314	Operating Systems	.4
CSC 324	Software Engineering	.4
CSC 354	Algorithm Analysis and Theory of Computation	.4
CSC 394	Programming Languages	.4
CSC 454	Computer Architecture and Assembly Language	.4
CSC 481	Senior Seminar in Comp. Science	.1
MTH 344	Discrete Mathematics	.4
<i>4 additional units chosen from:</i>		
CSC 334	Artificial Intelligence	.4
CSC 374	Computer Networks and Parallel Processing	.4
CSC 414	Topics in Computer Science	.4
CSC 491	Independent Study in Computer Science	.1-4
CSC 494	Senior Software Project	.4
ISS 413	Data Base Management Systems	.3
ISS 422	Internet Applications Development	.2
ISS 472	Internship In Information Systems	.2
MTH 203	Introduction to Statistics *	.3
MTH 232	Linear Algebra	.2
MTH 274	Calculus III	.4
MTH 312	Advanced Linear Algebra	.2
MTH 334	Applied Mathematics	.4
MTH 364	Mathematical Statistics *	.4
MTH 372	Numerical and Symbolic Computation	.2
HON 498	Honors Seminar I	.2
HON 499	Honors Seminar II	.1
	TOTAL	.29

\* *Only one of these two courses may apply as a CS elective, not both.*

# Mathematics (B.S.) MAJOR

## LOWER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
MTH 164	Calculus I	4
MTH 174	Calculus II	4
MTH 232	Linear Algebra	2
MTH 242	Number Theory with Proofs	2
MTH 274	Calculus III	4
CSC 142	Intro to Computer Programming	2
CSC 154	Fundamentals of Computer Science	4
CSC 252	Data Structures with Programming	2
PHY 241	University Physics I	4
TOTAL		28

## UPPER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
MTH 352	History of Mathematics	2
MTH 424	Real Analysis I	4
MTH 432	Real Analysis II <b>OR</b>	
MTH 452	Abstract Algebra II	2
MTH 444	Abstract Algebra I	4
MTH 481	Senior Seminar in Mathematics	1
MTH 492	Special Topics in Mathematics	2

Choose one course from:

MTH 312	Advanced Linear Algebra	2
MTH 372	Numerical and Symbolic Computation	2
MTH 412	Complex Analysis	2

Choose two courses from:

MTH 334	Applied Mathematics	4
MTH 344	Discrete Mathematics	4
MTH 364	Mathematical Statistics	4

Seven additional elective units from:

MTH 312	Advanced Linear Algebra	2
MTH 334	Applied Mathematics	4
MTH 344	Discrete Mathematics	4
MTH 364	Mathematical Statistics	4
MTH 372	Numerical and Symbolic Computation	2
MTH 402	Topics in Geometry	2
MTH 412	Complex Analysis	2
MTH 432	Real Analysis II	2
MTH 452	Abstract Algebra II	2
MTH 463	Secondary School Mathematics	3
MTH 471	History of Mathematics Study Tour	1
MTH 491	Independent Studies in Mathematics	4
MTH 492	Special Topics in Mathematics	2
HON 498	Honors Project I	2
HON 499	Honors Project II	1
TOTAL		32

Note: An elective class may not count as both part of the upper-division core and a required "additional elective."

## RECOMMENDED ELECTIVES FOR DEPARTMENT TRACKS:

**Graduate School:** Abstract Algebra II and Real Analysis II, Advanced Linear Algebra, Complex Analysis.

**Teaching:** The University's agreement with the State of California requires students seeking a Single Subject Teaching Credential in Mathematics to take Topics in Geometry, History of Mathematics, Mathematical Statistics, Discrete Mathematics, Secondary School Mathematics. In addition, students must take Education 304, Legal, Ethical and Wesleyan Perspectives in Education. Education 306, Principles of Language Acquisition is also recommended.

**Industry:** Numerical and Symbolic Computation, Complex Analysis, Mathematical Statistics and Applied Mathematics.

**Actuary:** Mathematical Statistics, Numerical and Symbolic Computation, Advanced Linear Algebra, and Discrete Mathematics.

# Mathematics (B.A.) MAJOR

## LOWER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
MTH 164	Calculus I	4
MTH 174	Calculus II	4
MTH 232	Linear Algebra	2
MTH 242	Number Theory with Proofs	2
MTH 274	Calculus III	4
CSC 142	Intro to Computer Programming	2
CSC 154	Fundamentals of Computer Science	4
TOTAL		22

## UPPER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
MTH 352	History of Mathematics	2
MTH 481	Senior Seminar in Mathematics	1
<b>Choose one course from:</b>		
MTH 424	Real Analysis I	4
MTH 444	Abstract Algebra I	4
<b>Choose one course from:</b>		
MTH 334	Applied Mathematics	4
MTH 344	Discrete Mathematics	4
MTH 364	Mathematical Statistics	4
<b>Thirteen additional elective units from:</b>		
MTH 312	Advanced Linear Algebra	2
MTH 334	Applied Mathematics	4
MTH 344	Discrete Mathematics	4
MTH 364	Mathematical Statistics	4
MTH 372	Numerical and Symbolic Computation	2
MTH 402	Topics in Geometry	2
MTH 412	Complex Analysis	2
MTH 424	Real Analysis I	4
MTH 432	Real Analysis II	2
MTH 444	Abstract Algebra I	4

MTH 452	Abstract Algebra II	2
MTH 471	History of Mathematics Study Tour	1
MTH 491	Independent Studies in Mathematics	1-4
MTH 492	Special Topics in Mathematics	2
HON 498	Honors Project I	2
HON 499	Honors Project II	1
	TOTAL	24

*Note: An elective class may not count as both part of the upper division core and a required "additional elective."*

## Information Systems (B.S.) MAJOR

### LOWER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
CSC 122	Introduction to Computers	2
CSC 132	Intro to Computer Science	2
CSC 142	Intro to Computer Programming	2
CSC 154	Fundamentals of Computer Science	4
CSC 254	Data Structures and Algorithms	4
ISS 162	Information Systems Practicum	2
ISS 234	Introduction to Information Systems	4
MTH 203	Introduction to Statistics	3
BUS 212	Principles of Management	4
ECO 102	Economics II (Microeconomics)	3
	TOTAL	30

### UPPER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
ISS 304	Business Application Software	4
ISS 314	Operating Systems	4
ISS 324	Software Engineering	4
ISS 413	Database Management Systems	3
ISS 422	Internet Applications Development	2
ISS 472	Internship in IS	2
ISS 481	Senior Seminar in Information Systems	1
ISS 484	Operations Management	4
CSC 374	Computer Networks and Parallel Processing	4

#### *Four units from:*

BUS 213	Administrative Communication	4
BUS 301	Legal Environment of Business	4
BUS 374	Industrial Organizational Psychology/Human Resources	4
HON 498	Honors Project I	2
HON 499	Honors Project II	1
	TOTAL	32

## Computer Science MINOR

A minor in Computer Science is offered to those who wish to complement study in another discipline. This minor is not available to students who earn a major in Information Systems. The requirements are:

### LOWER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
CSC 132	Intro to Computer Science	2
CSC 142	Intro to Computer Programming	2
CSC 154	Fundamentals of Computer Science	4
CSC 254	Data Structures and Algorithms	4
	TOTAL	12

### UPPER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
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*Choose 10 units from:*

CSC 314	Operating Systems	4
CSC 324	Software Engineering	4
CSC 334	Artificial Intelligence	4
CSC 354	Algorithm Analysis and Theory of Computation	4
CSC 374	Computer Networks and Parallel Processing	4
CSC 394	Programming Languages	4
CSC 414	Topics in Computer Science	4
CSC 454	Computer Architecture and Assembly Language	4
ISS 413	Data Base Management Systems	3
ISS 422	Internet Applications Development	2
	TOTAL	10

## Information Systems MINOR

A minor in Information Systems is offered to those who wish to complement study in another discipline. This minor is not available to students who earn a major in Computer Science.

### REQUIRED COURSES

COURSE #	TITLE	UNITS
CSC 122	Introduction to Computers	2
CSC 132	Introduction to Computer Science	2
CSC 142	Introduction to Computer Programming	2
CSC 154	Fundamentals of Computer Science	4
ISS 234	Introduction to Information Systems	4
BUS 212	Principles of Management	4
	<i>Choose six additional units from:</i>	
ISS 162	Information Systems Practicum	2
ISS 304	Business Application Software	4
ISS 413	Database Management Systems	3
ISS 472	Internship in IS	2
ISS 484	Operations Management	4
	TOTAL	24

# Mathematics MINOR

## REQUIRED COURSES

COURSE #	TITLE	UNITS
MTH 164	Calculus I	4
MTH 174	Calculus II	4
MTH 232	Linear Algebra	2
<i>Choose 12 additional units from:</i>		
MTH 242	Number Theory with Proofs	2
MTH 274	Calculus III	4
MTH 312	Advanced Linear Algebra	2
MTH 334	Applied Mathematics	4
MTH 344	Discrete Mathematics	4
MTH 352	History of Mathematics	2
MTH 364	Mathematical Statistics	4
MTH 372	Numerical and Symbolic Computation	2
MTH 402	Topics in Geometry	2
MTH 412	Complex Analysis	2
MTH 424	Real Analysis I	4
MTH 432	Real Analysis II	2
MTH 444	Abstract Algebra I	4
MTH 452	Abstract Algebra II	2
MTH 471	History of Mathematics Study Tour	1
MTH 492	Special Topics in Mathematics	2
	TOTAL	22

## Computer Science COURSES

### CSC 122 (2) INTRODUCTION TO COMPUTERS

An introduction to the tools used for computing, including operating system commands, word-processing, spreadsheets, network communication, graphical presentation tools, and database application programs. In addition an introduction to personal computer hardware, its characteristics and the ethical considerations of computing.

*Prerequisite: Mathematics 099.*

### CSC 132 (2) INTRODUCTION TO COMPUTER SCIENCE

An overview of the field of computer science, including computer architecture, operating systems and networks, algorithms, programming languages, software engineering, and the theory of computation. Lecture two hours and laboratory four hours each week.

*Prerequisite: Mathematics 113 (or equivalent).*

### CSC 142 (2) INTRODUCTION TO COMPUTER PROGRAMMING

Introduces the syntax of a high level programming language with emphasis on the programming environment and the use of the constructs of the language to write simple application programs. Lecture two hours and laboratory four hours each week.

*Prerequisite: CSC 132 or consent of instructor.*

### CSC 154 (4) FUNDAMENTALS OF COMPUTER SCIENCE

In the context of a modern programming language, such topics as problem solving strategies, basic data structures, and data and procedural abstraction are discussed. Programming problems involve game playing and the use of a graphical user interface. Lecture two hours and laboratory four hours each week.

*Prerequisite: Computer Science 132 and 142 or consent of instructor.*

### CSC 252 (2) DATA STRUCTURES WITH PROGRAMMING

This course introduces students to advanced programming concepts such as pointers and dynamic memory allocation necessary to implement elementary data structures such as stacks, queues, linked lists, hash tables, and binary search trees. Three lecture hours and two lab hours each week. Students who have taken Computer Science 254 may not take this class for credit. Offered on a Quad basis.

*Prerequisite: Computer Science 154.*

### CSC 254 (4) DATA STRUCTURES AND ALGORITHMS

Standard data structures, including queues, stacks, trees, and graphs, as objects are defined and illustrated with associated dynamic storage management mechanisms; computational complexity is explored through the design and analysis of searching, sorting, and graph algorithms. Lecture three hours and laboratory two hours each week.

*Prerequisite: Computer Science 154.*

### CSC 314 (4) OPERATING SYSTEMS

A course in systems software that is largely concerned with operating systems. Such topics as process management, device management, and memory management are discussed, as are relevant issues associated with security and protection. Computer hardware concepts related to operating systems are also covered. A significant component of the course covers graphical user interface, application programmer interface (API) provided by modern operating systems such as Windows NT and Unix.

*Prerequisite: Computer Science 254.*

### CSC 324 (4) SOFTWARE ENGINEERING

This course offers an in-depth treatment of the software development process. Software analysis and design study emphasizes an object-oriented approach that is introduced and contrasted with traditional design methodologies. CASE tools are used during the design process. Lecture three hours and laboratory two hours each week. Offered 2004-05.

*Corequisite: Computer Science 254.*