

College of Natural, Applied and Health Sciences

The mission of the College of Natural, Applied and Health Sciences is consistent with the overall mission of the University. The College of NAHS has strong, quality program offerings in the sciences and health professions. The faculty and staff are committed to providing relevant education and services to a diverse student population. The goal is to prepare students to think critically and creatively so that they can adapt to changing social, economic and technological conditions. Building external collaborations with major technological corporations and the health care industry is an integral part of the colleges outreach mission, which enables it to provide valuable services to the community as well as increased opportunities for students.

We are proud to have been designated the Flagship State University for the Health Professions. Our graduates can be found practicing in hospitals and other health care agencies across New Jersey. Also, our programs in the Sciences have a long distinguished record of service to this region. So, whether you are looking to study in the Natural and Physical Sciences, Health Care, Mathematics, Technology, or Computer Science, you will gain a strong foundation at the College of Natural, Applied and Health Sciences.

Interim Dean, Pablo Zafra

Assistant to the Dean, Lourdes F. Prieto

B-104, (908) 737-3600

ACADEMIC DEGREES, PROGRAMS

B.A. in Biology

- General Option
- Honors Option
- Teacher Certification Option
- Teacher of Students with Disabilities Option

B.S. in Biology

- General Option
- Biotechnology Option

B.A. in Chemistry

- General Option
- Preprofessional Option
- Teacher Certification Option

B.S. in Chemistry, Expanded Option

B.S. in Computer Science

- Information Systems Option

B.A. in Earth Science

- General Option
- Teacher Certification Option
- Teacher of Students with Disabilities Option

B. S. in Earth Science

- Earth System Science Option
- Geology Option
- Meteorology Option

B.A. in Mathematical Sciences

- Teacher Certification Option
- Teacher of Students with Disabilities Option

B.S. in Computer Integrated Design and Manufacturing Technology

B.S. in Electronics Technology

B.S. in Telecommunications and Information Technology

HEALTH PROFESSIONS

B.S. in Health Information Management

- General Option
- Occupational Therapy Track

B.S. in Medical Technology

- General Option
- Cytotechnology Option
- Histotechnology Option

B.S.N. in Nursing

Post Baccalaureate School Nurse Program

JOINT (OR COMBINED) DUAL DEGREE PROGRAMS

B.S. in Health Information Management/ M.S. Management Information Systems

B.S. in Health Information Management/ M.A. Communication Studies

B.A. / M.S. in Occupational Therapy

B.A. / DPT Physical Therapy (with UMDNJ)

COLLABORATIVE PROGRAM

BA in Elementary Education Liberal Studies in Mathematics, Science, and Technology:

- Biology Specialization
- Earth Science Specialization
- Mathematics Specialization
- Technology Specialization

DEPARTMENTS, FACULTY

Biological Sciences

Faculty: Codella, Field, Glazer, Hayat, James, Mancarella (Chairperson), Osborne, Porta, Pu, Rosenthal, Vassiliou, Yu, Zhang

Chemistry-Physics

Faculty: Castiglione, Criasia (Chairperson), Gao, Getzin, Hicks, Kampa, Kubow, Lees, Shin, Stokes-Huby, Vitale, Zarrilli

Geology and Meteorology

Faculty: Croft, Dobosiewicz, Krall, Kroll, Manfrino, Metz (Chairperson), Murphy, Ngoy, Yoh, Zois

Mathematics and Computer Science

Faculty: Abeles, Affouf, Alsina, Arnow, Avirappattu, Beaugris, Chang, Deavours, Emanouilidis, Hahn (Chairperson), Halper, Krantz, Lehmann, Lipson, Mathur, Narasimhan, Ryder, Santomauro, Stewart-Gardiner, Tse, Viglione, Wang, Wittenberg, Woubneh, Zafra

Technology

Faculty: Behi, Cokewood, Shahrabi (Chairperson)

Health Information Management

Faculty: Davis, Manger (Chairperson)

Medical Technology

Coordinator: Osborne

Nursing

Faculty: Campbell (Chairperson), Fitzgerald, Fitzsimons, Hascup, Krause-Parello, Neville, Pisani

Occupational Therapy

Faculty: Knis-Matthews, Richard, Stern (Chairperson)

Computer Science

Coordinator: Prof. Lee Wittenberg
(908) 737-3800

The courses of instruction in computer science are designed to provide for a major program with various emphases so that a student may select a background for the Computer Science major and the Computer Science Information Systems option.

ADMISSION REQUIREMENTS:

The Department of Mathematics and Computer Science has formally adopted the following standards for admission to all options of the Computer Science major:

1. Minimum cumulative GPA of 2.6 at the time of admission to the major.
2. At least 9 credits of CPS courses with a grade of "C" or better in each and these credits must have been taken at Kean University.

B.S. DEGREE COMPUTER SCIENCE

Design, development, and maintenance of computer systems from both a hardware and software perspective; science of computing; scientific and mathematical applications; preparation for advanced studies.

GENERAL EDUCATION REQUIREMENTS

50-51

FOUNDATIONS REQUIREMENTS 13

GE	1000	Transition to Kean	1
ENG	1030	College Composition	3
MATH	1000	Algebra for College Students #	3
COMM	1402	Speech Communication as Critical Citizenship	3
GE	2024	Research and Technology	3

DISCIPLINARY/INTERDISCIPLINARY DISTRIBUTION REQUIREMENTS

<i>Humanities</i>			9
*ENG	2403	World Literature	3
(Select two courses from different areas)			
Fine Arts or Art History			3
Philosophy or Religion			3
Foreign Languages			3
Music or Theatre			3
Interdisciplinary			3
<i>Social Sciences</i>			9
*HIST	1000	History of Civil Society in America	3
(Select two courses from different areas)			
Psychology			3
Economics or Geography			3
Political Science			3
Sociology or Anthropology			3
Interdisciplinary			3

<i>Science & Mathematics</i>			11
*MATH	1054	Precalculus ##	3
CPS	1231	Fund. of Computer Science **	4
Physics	2095	Physics I	4
<i>Health/Physical Education</i>			2, 3
ID	1225	Issues Contemporary Health	
OR			
ID	1010	Leisure & Rec Multicultural Soc	3
OR			
Physical Education			2
CONCENTRATION***			
MATH	2526	Applied Statistics or	
MATH	2026	Statistical Decision Theory	3
MATH	2110	Discrete Structures	3
* Required Distribution Course			
ADDITIONAL REQUIREMENTS***			29
TECH	1500	Intro. to Telecom.	3
TECH	2504	Dig. Circ. & Systems	4
TECH	2506	Data Comm. Technology	3
TECH	3510	Micro. Thry. Appl. & Intr.	4
ENG	3091	Technical Writing	3
MATH	2411	Calculus I	3
MATH	2412	Calculus II	3
MATH	2995	Matrix & Linear Alg.	3
(Select only one course from below)			
MATH	3120	Combinatorics	3
MATH	3155	Math. Logic	3
MATH	3225	Comp Meth Matrix & Lin. Alg. II	3
MATH	3247	Abstract Algebra I	3
MATH	3455	Differential Equations	3
MATH	3544	Probability & Math Statistics	3
MATH	3570	Multivariate Analysis	3
MATH	3940	Numerical Analysis	3
MATH	4404	Intro. App. Math	3
MATH	4545	App. Math. Statistics	3
MATH	4800	Elements Graph Theory	3
MAJOR AND CAPSTONE REQUIREMENTS***			41
<i>Major Core Requirements</i>			14
CPS	2231	Comp Org. & Prog Lang	4
CPS	2232	Data Structures & Alg Anal	4
CPS	2390	Org Architecture	3
CPS	3250	Comp Operating Systems	3
<i>Concentration Requirements</i>			15
CPS	4150	Comp Architecture	3
CPS	4200	Systems Programming	3
CPS	4222	Principles of Networking	3
CPS	4301	Software Engineering (WE)	3
<i>Major/GE Capstone Course</i>			
CPS	4893	Sr. Seminar in Comp Science	3

Major Electives 12
Four additional courses in Computer Science, at the 3000 level or above selected with approval of departmental advisor.

FREE ELECTIVES 11-12
(50% of free electives must be taken at the 3000-4000 level)

TOTAL 132

Note on Free Electives

CPS 4999 Cooperative Education may be counted as a free elective (no more than 3 S.H.). There are four prerequisites for CPS 4999 which are listed on the program guidesheet.

Students eligible to take MATH 1054
Precalculus based on their placement test may take that course in place of MATH 1000 and take an additional three credits in Free Electives to total 132 S.H.

Students eligible to take MATH 2411 Calculus I based on their placement test may take that course in place of Math 1054. In that case, MATH 2411 will fulfill the Distribution requirement and the student may take an additional three credits in Free Electives to total 132 S.H.

** Students who have had prior programming experience may enter CPS 2231 directly. In this case, CPS 2231 will be counted as the Distribution requirement and the student may take another 4 credits in Free Electives to total 132 S.H.

***All major courses, additional requirements and concentration courses, including the capstone, require a grade of C or better.

B.S. DEGREE COMPUTER SCIENCE

OPTION: INFORMATION SYSTEMS

Design, development, maintenance, and management of information-based systems common to business environments.

GENERAL EDUCATION REQUIREMENTS

50-51

FOUNDATIONS REQUIREMENTS 13

GE	1000	Transition to Kean	1
ENG	1030	College Composition	3
MATH	1000	Algebra for College Students #	3
COMM	1402	Speech Communication as Critical Citizenship	3
GE	2024	Research and Technology	3

DISCIPLINARY/INTERDISCIPLINARY DISTRIBUTION REQUIREMENTS

<i>Humanities</i>			9
*ENG	2403	World Literature	3
(Select two courses from different areas)			
Fine Arts or Art History			3
Philosophy or Religion			3
Foreign Languages			3

Music or Theatre	3	MAJOR/GE CAPSTONE COURSE	
Interdisciplinary	3	CPS 495 I Design/Devel. Project	3
Social Sciences	9	Major Electives	12
*HIST 1000 History of Civil Society in America	3	FOUR additional courses in Computer Science, at the 3000 level or above selected with approval of departmental advisor.	
(Select two courses from different areas)			
Psychology	3	FREE ELECTIVES	11-12
Economics or Geography	3	(50% of free electives must be taken at the 3000-4000 level)	
Political Science	3	TOTAL	124
Sociology or Anthropology	3	Note on Free Electives	
Interdisciplinary	3	CPS 4999 Cooperative Education may be counted as a free elective (no more than 3 S.H.). There are four prerequisites for CPS 4999 which are listed on the program guidesheet	
SCIENCE & MATHEMATICS	11	# Students eligible to take Math 1054 Precalculus based on their placement test may take that course in place of Math 1000 and take an additional three credits in Free Electives to total 124 S.H.	
*MATH 1054 Precalculus ##	3	## Students eligible to take Math 2411 Calculus I based on their placement test may take that course in place of Math 1054. In that case, Math 2411 will fulfill the Distribution requirement and the student may take an additional three credits in Free Electives to total 124 S.H.	
CPS 1231 Fund. of Computer Science **	4	** Students who have had prior programming experience may enter CPS 2231 directly. In this case, CPS 2231 will be counted as the Distribution requirement and the student may take another 4 credits in Free Electives to total 124 S.H.	
(Select one lab science from below)		***All major courses, additional requirements and concentration courses, including the capstone, require a grade of C or better.	
Biology	4		
Chemistry or Physics	4		
Astronomy, Geology or Meteorology	4		
HEALTH/PHYSICAL EDUCATION	2, 3		
ID 1225 Issues Contemporary Health	OR		
ID 1010 Leisure & Rec in Multicultural Soc	3		
OR			
Physical Education	2		
*Required Distribution Course			
CONCENTRATION***	6		
MATH 2110 Discrete Structures	3		
MATH 2526 Applied Statistics	3		
ADDITIONAL REQUIREMENTS***	21		
ENG 3091 Technical Writing	3		
COMM2405 Public Speaking	3		
ACCT 2200 Accounting I	3		
MATH 2411 Calculus I	3		
FIN 3310 Mgt. Corp. Finance I	3		
Select one of the following two courses:			
ACCT 2210 Principles of Accounting II	3		
MGS 2030 Business Org and Mgmt.	3		
Select one of the following two courses:			
MATH 2412 Calculus II	3		
MATH 2995 Matrix & Linear Algebra	3		
MAJOR AND CAPSTONE REQUIREMENTS***	41		
Major Core Requirements	14		
CPS 2231 Comp. Org. & Prog. Lang.	4		
CPS 2232 Data Structures & Alg. Analysis	4		
CPS 2390 Org. & Architecture	3		
CPS 3250 Comp. Operating Systems	3		
Concentration Requirements	15		
CPS 3351 Info. Systems Programming	3		
CPS 3740 Database Management	3		
CPS 3962 Systems Analysis & Design (WE)	3		
CPS 4931 Distributed Systems Appl.	3		

communications; information systems. Not for credit in Computer Science major.
Prerequisites: Fulfillment of Developmental Math requirements.
General Education Distribution Course

CPS 1032 Microcomputer Applications (3)

A study of the microcomputer and its role in the development and organization of data in files and databases for information generation. Emphasis is on the selection and proper use of microcomputer application packages to fulfill the information needs of business and support management problem solutions. Students will be introduced to a variety of microcomputer application packages. Not for credit in Computer Science Major.
Prerequisites: 3 Hours of CPS
General Education Distribution Course

#CPS 1231 Fundamentals of Computer Science (4)

Fundamental computing concepts, components and processes; hardware and software components; communications and information systems; use of systems software; problem solving with application software; introduction to design of algorithms using a high-level programming language. (3 hr. lec./1 hr. lab.)
Prerequisite: MATH 1000. ENG 1030 or equiv.
General Education Distribution Course

#CPS 2231 Computer Organization and Programming (4)

Fundamental computing concepts and processes; use, development, analysis and style of algorithms involving a high-level programming language; structured programming concepts. (3 hr. lec./1 hr. lab.)
Prerequisites: CPS 1231 and MATH 1054 or computer programming experience and permission of instructor.

#CPS 2232 Data Structures and Algorithm Analysis (4)

The theory of Abstract Data Types (ADTs); applications and implementations of the classical ADTs including lists, sets, stacks, queues, trees, and graphs; recursion; elementary algorithm analysis. (3 hr. lec./1 hr. lab.)
Prerequisites: CPS 2231 and MATH 2110.
Replaces CPS 1031, CPS 2341, CPS 2342, CPS 2440 for computer science majors; replaces CPS 1031, CPS 2341, CPS 2342 for mathematics and meteorology majors.

CPS 2390 Organization and Architecture (3)

Fundamental concepts of assembly language programming as a means of introducing computer architecture. Data representation, logic gates, CPU and memory organization, the instruction cycle, addressing modes, high and low level code equivalence from assignments and iteration to subroutine and parameter passing.
Prerequisite: CPS 2231 and MATH 2110.

CPS 3250 Computer Operating Systems (3)

Historical development of operating systems, types of operating systems, CPU scheduling, memory management, file organization and access, concurrent processes, I/O organization.
Prerequisite: CPS 2232 and CPS 2390.

CPS 3276 Local Area Networks (3)

An introduction to operation and software design for local area networks: ISO/IEEE network standards, survey of network operating systems, setting up a network, LAN programming at the system level, NETBIOS and assembly level network programming.

Prerequisite: Completion of CPS Core.

CPS 3310 Computer Programming Languages (3)

A study of characteristics of programming languages and classifications: machine, procedure-oriented, numerical, scientific, business data processing, string and list grammars, multipurpose, control and basic compiler methods.

Prerequisite: CPS 2390.

#CPS 3351 Information Systems Programming (3)

Information systems computing concepts and processes using a high level visual programming language; information systems requirements, design, construction and testing.

Prerequisite: CPS 2232

Replaces CPS 2351 and CPS 2352

CPS 3410 Applied Algorithms and Data Structures (3)

An investigation into the application of algorithms using a high level language. The application of structured programming concepts in a "hands-on" environment. The investigation and development of projects emulating the "real world."

Prerequisite: Completion of CPS Core.

CPS 3440 Advanced Algorithms and Complexity Theory (3)

Algorithmic analysis. Measures of complexity. Best case, worst case, and average behavior. Algorithms involving sorting, graphs, networks, and number theory. NP-Completeness.

Prerequisites: Completion of CPS Core, MATH 2110 and MATH 2412.

CPS 3498 Computer Security and Information Theory (3)

Information and coding, measurement and transmission of information, redundancy, noise, data bank security in government and industry, computer network weaknesses, data encryption.

Prerequisite: CPS 2232.

CPS 3500 Programming The World Wide Web (3)

The Internet and the World Wide Web, Unix essentials, TCP/IP, MIME, browsers, HTML, the Winsock API, Introduction to PERL, CGI, Web server configuration and administration, Java script and Java, Client/server computing on the Web.

Prerequisite: CPS 2232 or Equivalent or permission of instructor

CPS 3740 Database Management Systems (3)

Design, implementation and administration of data base management systems. Their benefits and use in organizations.

Prerequisite: CPS 2232 or permission of instructor.

Writing Emphasis Course

CPS 3884 Functional Programming (3)

Lambda Calculus; recursion; continuations; closures; evaluation; functional programming in COMMON LISP.

Prerequisite: CPS 2232.

CPS 3962 Information Systems Analysis and Design (3)

Design and analysis of Computer Information Systems. Topics will include Systems Development Life Cycle, Design and Analysis tools, CASE tools, File and Database systems.

Prerequisites: CPS 3351 or permission of instructor.

CPS 4130 Data Communication Systems (3)

Data communication terminology and concepts; identification of hardware and software components; networking; survey and usage of protocols; security.

Prerequisite: CPS 3250.

CPS 4150 Computer Architecture (3)

The fundamental concepts of modern machine organization and the implementation of instructions with emphasis on the major factors determining computer performance.

Prerequisite: Completion of CPS Core and TECH 3510 (corequisite).

CPS 4200 Systems Programming (3)

Module development of modern system functions and extensions. Topics include: multi-tasking, windowing, large address spaces, interrupts operating systems such as UNIX and Windows.

Prerequisite: CPS 3250.

CPS 4220 Compiler Construction (3)

A practical and theoretical introduction to compilers for high-level programming languages with emphasis is placed on accepted techniques for constructing compilers.

Prerequisite: Completion of CPS Core.

CPS 4222 Principles of Networking (3)

Mathematical preliminaries, electromagnetic phenomena, encoding methods, error detection and correction, network topologies, frame formats, routing and the OSI model, LAN, MAN, and WAN characteristics, mathematical modeling of networks.

Prerequisites: Completion of CPS Core, TECH 2506, MATH 2412 & MATH 2026 or MATH 2526

CPS 4301 Software Engineering (3)

The study of Software Engineering methodologies for the development of quality, cost effective, schedule-meeting software.

Prerequisites: Completion of CPS Core.

Writing Emphasis Course

CPS 4408 Computer Graphics Algorithms (3)

Applications of Computer Graphics; Input and Output Devices; Line Drawing Algorithms; Windows; Viewports; Clipping; Two-Dimensional Transformations; Three-Dimensional Transformations; Projections; Animation.

Prerequisites: CPS 2232, MATH 2995.

CPS 4410 Systems Simulation (3)

Simulation as a problem solving technique; modeling; queuing models; random number

generators; testing of random number generators; the Monte Carlo technique; generating random varieties; a simulation package.

Prerequisites: Completion of CPS Core, MATH 2026 & 2412.

CPS 4501 Formal Language and Automata Theory (3)

The study of the concepts and theory of Formal Language and the relationship to automata; types of grammars; Turing machine.

Prerequisites: CPS 3310, MATH 2110.

CPS 4801 Artificial Intelligence (3)

Representation of knowledge; reasoning models; language learning.

Prerequisites: Completion of CPS Core or permission of instructor.

CPS 4893 Senior Seminar in Computer Science (3)

An in-depth exploration of one or more current issues in Computer Science, involving the application of a variety of concepts taken from throughout the Computer Science curriculum.

Prerequisite: Completion of 30 semester hours in Computer Science at the 2000 level or above.

CPS 4931 Distributed Systems Applications (3)

Principles and concepts along with the design and development of distributed systems applications. Concurrent operating systems and database requirements for the development of a transaction processing application in a network environment, using the client/server paradigm.

Prerequisite: Completion of CPS Core.

CPS 4951 Design/Development Project (3)

A software implementation course that integrates theory and practice in design and development of a large computer information system. The student will choose a project, and then research, design, code test, document, demonstrate and present results to the class. The instructor must approve the project.

Prerequisites: CPS 3962 and CPS 4931

CPS 4980, 4981, 4982 Special Topics in Computer Science (3)

Research study of areas in computer science influenced by contemporary developments as well as interests and needs of students majoring in computer science. A maximum of nine semester hours may be taken in this area towards major electives.

Prerequisite: Permission of instructor.

CPS 4999 Cooperative Education in Computer Science (3)

Practical field experience providing resources other than those within the college environment. These credits cannot be used towards the 39 credits of course work required for computer science majors.

Prerequisites: Minimum completion of CPS Core; minimum 3.00 GPA in major; minimum 2.75 cumulative GPA; approval of advisory committee.