

**The Computational Science program offers students the opportunity to acquire a knowledge in computing integrated with knowledge in one of the following areas of study: (a) bioinformatics, (b) computational physics, (c) computational chemistry, (d) computational mathematics, (e) environmental science informatics, (f) health informatics, (g) digital forensics and cyber security, (h) business informatics, (i) biomedical informatics, (j) computational engineering physics, and (k) computational engineering technology. Graduates of this program major in computational science with a concentration in one of the above areas of study.
(Amended for clarification 12/5/2018).*

**Previous UTRGV language:*

Computational science graduates develop emphasis in two major fields, one in computer science and one in another field, in order to integrate an interdisciplinary computing degree applied to a number of emerging areas of study such as biomedical-informatics, digital forensics, computational chemistry, and computational physics, to mention a few examples. Graduates of this program are prepared to enter the workforce or to continue a graduate studies either in computer science or in the second major.

A – GENERAL EDUCATION CORE – 42 HOURS

Students must fulfill the General Education Core requirements. The courses listed below satisfy both degree requirements and General Education core requirements.

Required

020 - Mathematics – 3 hours

For all concentrations:

MATH 2413 Calculus I (or MATH 2487 Honors) three-hour lecture

030 - Life and Physical Science – 6 hours

For Bioinformatics, Biomedical Informatics, and Computational Chemistry concentrations:

CHEM 1311 General Chemistry I

CHEM 1312 General Chemistry II

For Computational Physics, Computational Mathematics, and Computational Engineering Physics concentrations:

PHYS 2425 Physics for Scientists and Engineers I three-hour lecture

PHYS 2426 Physics for Scientists and Engineers II three-hour lecture

For Environmental Science Informatics and Health Informatics concentrations:

BIOL 1406 General Biology I three-hour lecture (or BIOL 1487 Honors)

BIOL 1407 General Biology II three-hour lecture (or BIOL 1488 Honors)

For Digital Forensics and Cyber Security concentration:

BIOL 1406 General Biology I three-hour lecture (or BIOL 1487 Honors)

CHEM 1311 General Chemistry I

For Computational Engineering Technology concentration:

PHYS 2425 Physics for Scientists and Engineers I three-hour lecture

CHEM 1311 General Chemistry I

080 - Social and Behavioral Sciences – 3 hours

For Health Informatics, Digital Forensics and Cyber Security, and Biomedical Informatics concentrations:

PSYC 2301 General Psychology

For Business Informatics, Computational Engineering Physics, and Computational Engineering Technology concentrations:

ECON 2301 Principles of Macroeconomics

090 - Integrative and Experiential Learning – 5 hours

For all concentrations:

CSCI 1380 Computer Science I

Concentrations with specified Life and Physical Science courses must choose respective labs below:

BIOL 1406 General Biology I one-hour lab (or BIOL 1487 Honors)

BIOL 1407 General Biology II one-hour lab (or BIOL 1488 Honors)

CHEM 1111 General Chemistry I Lab

CHEM 1112 General Chemistry II Lab

PHYS 2425 Physics for Scientists and Engineers I one-hour lab

PHYS 2426 Physics for Scientists and Engineers II one-hour lab

B – MAJOR REQUIREMENTS – 67 HOURS (45 advanced)

1 – Computational Science Core – 28 hours (18 advanced)

CSCI 2333 Computer Organization and Assembly Language
CSCI 2380 Computer Science II (or CSCI 2388 Honors)
CSCI 3310 Mathematical Foundations of Computer Science
CSCI 3333 Algorithms and Data Structures
CSCI 3340 Software Engineering I
CSCI 4333 Database Design and Implementation
CSCI 4345 Computer Networks
CSCI 4390 Senior Project
ELEE 2130 Digital Systems Engineering I Lab
ELEE 2330 Digital Systems Engineering I

2 – Computational Science Electives – 9 hours (9 advanced)

Choose 9 hours of advanced CSCI courses.

3 – Concentration – 30 hours (18 advanced minimum)

Choose one of the following concentrations:

a – Bioinformatics – 30 hours (18 advanced)

i – Bioinformatics Core – 23 hours (11 advanced)

BIOL 1406 General Biology I (or BIOL 1487 Honors)
BIOL 1407 General Biology II (or BIOL 1488 Honors)
BIOL 2143 General Biology III Lab
BIOL 2343 General Biology III
BIOL 3409 Ecology
BIOL 3413 Genetics
BIOL 4301 Evolution

ii – Bioinformatics Electives – 7 hours (7 advanced)

Choose 7 hours of advanced BIOL courses.

b – Computational Physics – 30 hours (19 advanced)

i – Computational Physics Core – 23 hours (19 advanced)

MATH 2415 Calculus III
MATH 3341 Differential Equations
PHYS 3301 Electromagnetic Theory I
PHYS 3303 Thermodynamics
PHYS 3305 Classical Mechanics
PHYS 3402 Modern Physics
PHYS 4303 Quantum Mechanics I

ii – Computational Physics Electives – 7 hours

Choose 7 hours of PHYS courses.

c – Computational Chemistry – 30 hours (18 advanced)

i – Computational Chemistry Core – 21 hours (13 advanced)

CHEM 2101 Analytical Chemistry Lab
CHEM 2301 Analytical Chemistry
CHEM 2123 Organic Chemistry I Lab
CHEM 2323 Organic Chemistry I
CHEM 3103 Biochemistry I Lab
CHEM 3104 Physical Chemistry I Lab
CHEM 3202 Inorganic Chemistry Lab
CHEM 3301 Inorganic Chemistry
CHEM 3303 Biochemistry I
CHEM 3304 Physical Chemistry I

ii – Computational Chemistry Electives – 9 hours (5 advanced)

Choose 9 hours of CHEM or PHYS courses, of which 5 must be advanced.

d – Computational Mathematics – 30 hours (26 advanced)

i – Computational Mathematics Core – 16 hours (12 advanced)

MATH 2415 Calculus III
MATH 3341 Differential Equations
MATH 3350 Introduction to Mathematical Proof
MATH 3352 Modern Geometry I
MATH 3363 Modern Algebra I

ii – Computational Mathematics Electives – 6 hours (6 advanced)

Choose 6 hours of advanced MATH courses.

iii – Computational Science Electives – 8 hours (8 advanced)

Choose 8 hours of advanced CSCI courses.

e – Environmental Science Informatics – 30 hours (18 advanced)

i – Environmental Science Informatics – 18 hours (10 advanced)

ENVR 1401 Introduction to Environmental Science I
ENVR 1402 Introduction to Environmental Science II
ENVR 3301 Natural Resources Conservation
ENVR 3303 Research Methodology and Data Analysis in Environmental Sciences
ENVR 3405 Oceanography

ii – Environmental Science Informatics Electives – 12 hours (8 advanced)

Choose 12 hours of ENVR or GEOL courses, of which 8 must be advanced.

f – Health Informatics – 30 hours (22 advanced)

Requires admission to School of Biomedical Informatics from UT Health Science Center at Houston.

i – Health Informatics – 15 hours (7 advanced)

BIOL 2401 Anatomy and Physiology I
BIOL 2402 Anatomy and Physiology II
BIOL 4407 Animal Parasitology
HIUT 4300 Introduction to Health Informatics

ii – Health Informatics Electives – 12 hours (12 advanced)

HIUT electives must be approved by School of Biomedical Informatics from UT Health Science Center at Houston.

iii – Biological Systems Electives – 3 hours (3 advanced)

Choose one:

BIOL 3310 Neurobiology
BIOL 3345 Animal Nutrition
BIOL 3405 Histology

g – Digital Forensics and Cyber Security – 30 hours (30 advanced)

CRIJ 3303 Criminology
CRIJ 3304 Criminal Justice Research Methods
CRIJ 3310 The Constitution and Criminal Law
CRIJ 3315 Forensic Investigation I
CRIJ 3316 Criminal Evidence and Proof
CRIJ 3320 Evidence for Forensic Investigation
CRIJ 3416 Forensic Investigation II
CRIJ 4230 Seminar: Forensics Investigation
CRIJ 4321 White-Collar and Organized Crime
CRIJ 4325 Medical-Legal Forensics Investigation

h – Business Informatics – 30 hours (21 advanced)

ACCT 2301 Introduction to Financial Accounting
ACCT 2302 Introduction to Managerial Accounting
BLAW 3337 Business Law I
ECON 2302 Principles of Microeconomics
FINA 3380 Introduction to Finance
MARK 3300 Principles of Marketing

MGMT 3361 Principles of Management
MGMT 4363 Operations Management
MGMT 4389 Strategic Management
QUMT 3343 Statistical Methods for Business

i – Biomedical Informatics – 30 hours (18 advanced)

BMED 1101 Introductory Medical Biochemistry
BMED 1102 Introduction to Biomedical I Lab
BMED 1103 Introductory Cell Biology
BMED 1104 Introductory Molecular Biology
BMED 1105 Introductory Medical Genetics
BMED 1106 Introductory Medical Microbiology
BMED 1107 Introductory Immunology
BMED 1108 Introductory Medical Neuroscience
BMED 1110 Introductory Medical Physiology
BMED 1111 Introduction to Biomedical II Lab
BMED 2101 Gross Anatomy
BMED 2102 Molecules, Cells, and Tissues
BMED 3101 Pathobiology and Host Defense
BMED 3102 Neurochemistry
BMED 3103 Human Behavior
BMED 3104 Integrated Body Systems I: Cardiovascular and Pulmonary
BMED 3105 Integrated Body Systems II: Gastrointestinal Systems
BMED 3106 Integrated Body System III: Renal, Fluid, and Electrolytes
BMED 3107 Integrated Body System IV: Endocrine and Reproductive Systems
BMED 3108 Integrated Body System V: Dermatology, Hematology, and Musculoskeletal System
BMED 3109 Medical Syndromes
BMED 4220 Medical Bioinformatics, Genomics, and Systems Biology
BMED 4230 Human Genetics and Medical Genomics
BMED 4240 Medical Microbiology
BMED 4310 Medical Biochemistry

j – Computational Engineering Physics – 30 hours (20 advanced)

i – Computational Engineering Physics – 24 hours (14 advanced)

ENGR 2301 Engineering Mechanics I: Statics
ENGR 2302 Engineering Mechanics II: Dynamics
ENGR 2105 Linear Circuits Lab
ENGR 2305 Linear Circuits
ENGR 3304 Mechanics of Materials
ENGR 3121 Electronics I Lab
ENGR 3321 Electronics I
ENGR 4441 Control Systems
MATH 3341 Differential Equations

ii – Computational Engineering Physics – 6 hours (6 advanced).

Choose 6 hours of advanced ENGR courses.

k – Computational Engineering Technology – 30 hours (18 advanced)

i – Computational Engineering Technology Core – 21 hours (12 advanced)

ENGT 2307 Engineering Materials I for Engineering Technology
ENGT 2310 Introduction to Manufacturing Processes
ENGT 2321 Basic Electronics
ENGT 3312 Renewable Energy Technology
ENGT 3321 Solar Energy Systems
ENGT 3333 Quality Control
ENGT 4340 Robotics and Automation

ii – Computational Engineering Technology – 9 hours (6 advanced)

Choose 9 hours of ENGT courses, of which 6 hours must be advanced.

C – SUPPORT COURSES – 11 HOURS (3 advanced)

MATH 2318 Linear Algebra

MATH 2413 Calculus I (or MATH 2487 Honors) one-hour lecture

MATH 2414 Calculus II (or MATH 2488 Honors)

STAT 3301 Applied Statistics for Science, Engineering, and Medical Science

TOTAL CREDIT HOURS FOR GRADUATION – 120 HOURS

TOTAL ADVANCED HOURS (MINIMUM) – 48 HOURS

ADMISSION, PROGRESSION, AND GRADUATION REQUIREMENTS, if applicable:

Graduation requirements

In addition to the graduation requirements listed in the UTRGV 2017-2018 Undergraduate Catalog, demonstration of proficiency in a language other than English is required at the undergraduate level equivalent to a minimum of six credit hours. Proficiency can be demonstrated by a college credit exam, a placement test approved through the UTRGV Department of Writing and Language Studies, and/or up to six credit hours of college-level language coursework.