### DEGREE: BACHELOR OF SCIENCE IN COMPUTER SCIENCE

For students entering under UG Catalog 2022-2023

Credits required for graduation: **123**

<table>
<thead>
<tr>
<th>FALL SEMESTER FIRST YEAR</th>
<th>Credits</th>
<th>SPRING SEMESTER FIRST YEAR</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHEM 1035 General Chemistry</td>
<td>Pre: Eligible to enroll; Co: MATH 1025 or MATH 1225</td>
<td>3</td>
<td>PHYS 2305 Found of Physics I w/lab</td>
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<tr>
<td>CHEM 1045 General Chemistry Lab</td>
<td>Co: CHEM 1035</td>
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<tr>
<td>ENGL 1105 First-Year Writing</td>
<td>3</td>
<td>ENGL 1106 First-Year Writing</td>
<td>Pre: ENGL 1105</td>
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<tr>
<td>MATH 1225 Calculus of a Single Variable (C)</td>
<td>Pre: Eligible to enroll</td>
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<td>MATH 1226 Calculus of a Single Variable</td>
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<tr>
<td>ENGE 1215 Foundations of Engineering (C)</td>
<td>2</td>
<td>ENGE 1216 Foundations of Engineering (C)</td>
<td>Pre: ENGE 1215 (C-)</td>
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<tr>
<td>Pathways</td>
<td>3</td>
<td>CS 1114(^{[1]}) Intro to Software Design (C)  —OR—</td>
<td>CS 2064(^{[1]}) Intermediate Programming in Python (C) Pre: CS 1064</td>
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<td><strong>TOTAL</strong></td>
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<tr>
<th>FALL SEMESTER SECOND YEAR</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>MATH 2204(^{[1]}) Intro Multivariable Calculus</td>
<td>Pre: MATH 1226 or CMDA 2005(^{[1]}) Integrated Quantitative Sciences Pre: MATH 1226; Co: MATH 2114</td>
<td>3</td>
<td>Communications Elective</td>
</tr>
<tr>
<td>MATH 2534(^{[1]}) Intro Discrete Math</td>
<td>Pre: CS 1114 (C) or CS 2064 (C) or ECE 1574 (C-) or ECE 1004 (Note: Math double majors take MATH 3034)</td>
<td>3(^{[F, S, S I]})</td>
<td>MATH 2114(^{[1]}) Introduction to Linear Algebra</td>
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<tr>
<td>CS 2114 Software Design &amp; Data Structures (C)</td>
<td>Pre: 1114 (C) or 2064 (C)</td>
<td>3(^{[F, S, S I, S I I]})</td>
<td>CS 2505(^{[1]}) Intro to Computer Organization I (C)</td>
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<tr>
<td>CS 1944 Computer Science 1st Yr Sem</td>
<td>Pre: 1114 (C) or 2064 (C) or ECE 2514 (C)</td>
<td>1(^{[F, S]})</td>
<td>Pathways</td>
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<tr>
<td>CS 2104(^{[2]}) Intro to Problem Solving in CS (C)</td>
<td>Pre: (1114 (C) or 2064 (C) or ECE 2514 (C)), MATH 1225</td>
<td>3(^{[F, S, S I]})</td>
<td>Pathways</td>
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<tr>
<td>Natural Science Elective</td>
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<th>FALL SEMESTER THIRD YEAR</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>MATH 3134 Applied Combinatorics</td>
<td>Pre: (MATH 1206 or MATH 1226), (MATH 2534 or MATH 3034) (Note: Math double majors take MATH 3124)</td>
<td>3</td>
<td>Statistics Elective</td>
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<tr>
<td>CS 2506(^{[2]}) Intro to Computer Organization II (C)</td>
<td>Pre: (2114 (C) or ECE 3514 (C)), (2505 (C) or ECE 2564 (C)), (MATH 2534 or MATH 3034)</td>
<td>3(^{[F, S]})</td>
<td>CS 3214(^{[1]}) Computer Systems</td>
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<tr>
<td>CS 3114(^{[2]}) Data Structures and Algorithms (C)</td>
<td>Pre: (2114 (C) or ECE 3514 (C)), (2505 (C) or ECE 2564 (C)), (MATH 2534 or MATH 3034)</td>
<td>3(^{[F, S, S I]})</td>
<td>CS 3604(^{[1]}) Professionalism in Computing</td>
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<tr>
<td>Professional Writing Elective</td>
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<td>Pathways</td>
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<td><strong>TOTAL</strong></td>
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<tr>
<th>FALL SEMESTER FOURTH YEAR</th>
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<tbody>
<tr>
<td>CS 3304(^{[2]}) Comparative Languages</td>
<td>Pre: 3114 (C)</td>
<td>3(^{[F, S]})</td>
<td>CS 4944 Senior Seminar</td>
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<tr>
<td>CS Theory Elective(^{[2]})</td>
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<td>CS 4XXX(^{[2]}) Capstone</td>
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<tr>
<td>CS 3/4/5XXX Elective</td>
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<td>CS 4/5XXX(^{[2]}) Elective</td>
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<tr>
<td>CS Technical Elective</td>
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<td>Pathways</td>
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<tr>
<td>Free elective</td>
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<td><strong>TOTAL</strong></td>
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\(^{[1]}\) Available to take at the student's discretion.

\(^{[2]}\) Forbidden to take for credit towards degree.

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### DEPARTMENT OF COMPUTER SCIENCE

TOTAL \(123\) credits required for graduation.
To qualify for a B.S. degree in CS, a student must:

- Earn a "C" (2.0) or better in CS 1114, CS 2104, CS 2114, CS 2505, CS 2506 and CS 3114.
- Complete at least 123 semester credit hours with a minimum overall GPA of 2.00 and a minimum in-major GPA of 2.00 (the in-major GPA is calculated using all classes with a CS designator).
Note: Some elective courses may include prerequisites not required by this checksheet. It is the student’s responsibility to be aware of prerequisites and to ensure that all prerequisites are completed prior to enrolling in the chosen course. Some courses may be restricted to majors other than CS in some semesters. Check the Undergraduate Course Catalog and consult with an academic advisor to confirm your eligibility for specific electives. Actual course offerings are subject to availability of sufficient resources, including faculty availability and student demand.

1. **Natural Science Elective.** A minimum of 12 hours of natural science is required. Of those hours, 8 hours must be in a sequence. In addition to the required CHEM 1035/45 and PHYS 2305, this requirement may be satisfied by taking (a) CHEM 1036/46, (b) PHYS 2306, or (c) an eight hour sequence in Biology: BIOL 1105-6 & 1115-6.

2. **Communications Elective.** Students must take one of the following:

   COMM 2004  Public Speaking  Pre: Completion of 30 hours
   COMM 2014  Speech Communication

   **Note:** COMM 2004 can be used to satisfy Pathways 1A. Students who do not take COMM 2004 as their communications elective will need to satisfy Pathways 1A through a suitable professional writing elective or free elective.

3. **Professional Writing Elective.** Students must take one of the following:

   ENGL 3764  Technical Writing  Pre: ENGL 1106 or ENGL 1204H or COMM 1016
   ENGL 3804  Technical Editing and Style  Pre: ENGL 1106 or ENGL 1204H or COMM 1016
   ENGL 3814  Creating User Documentation  Pre: ENGL 1106 or ENGL 1204H or COMM 1016
   ENGL 3824  Visual Rhetoric and Document Design  Pre: ENGL 1106 or COMM 1016
   ENGL 3834  Intercultural Issues in Professional Writing  Pre: ENGL 1106 or ENGL 1204H or COMM 1016
   ENGL 3844  Writing and Digital Media  Pre: ENGL 1106 or ENGL 1204H or COMM 1016
   ENGL 4824  Science Writing  Pre: ENGL 1106 or ENGL 1204H or COMM 1016

   **Note:** ENGL 3764 can be used to satisfy Pathways 1A. Students who do not take ENGL 3764 as their communications elective will need to satisfy Pathways 1A through a suitable communications elective or free elective.

4. **Statistics Elective.** Students must take one of the following:

   STAT 4705  Probability and Statistics for Engineers  Pre: MATH 2224 or MATH 2204 or MATH 2204H or MATH 2406H
   STAT 4105  Theoretical Statistics  Pre: MATH 2224 or MATH 2204 or MATH 2204H or MATH 2406H
   STAT 4714  Probability and Statistics for Electrical Engineers  Pre: MATH 2224 or MATH 2204 or MATH 2204H or MATH 2406H
   STAT 4604  Statistical Methods for Engineers  Pre: MATH 1206 or MATH 1226
   STAT 3704  Statistics for Engineering Applications  Pre: MATH 2224 or MATH 2204 or MATH 2204H or MATH 2406H
   CMDA 2006  Integrated Quantitative Sciences  Pre: CMDA 2005, (MATH 2114 or MATH 2114H)

   Note that students taking STAT 3704 must take an additional 1 free elective credit to meet the total number of credits required for the degree.

5. **CS 3/4/5XXX Electives.** Any 3-credit CS 3/4/5000-level course not otherwise used to fulfill a Computer Science requirement can be used as a CS 3/4/5XXX elective, including both Independent Study (CS 4974) and Undergraduate Research (CS 4994), except for the following: CS 5040, CS 5044, CS 5045, 5046, 5644, 5664, 5904, 5944, 5974, 5994.

6. **CS 4/5XXX Elective.** Any 3-credit CS 4/5000-level course not otherwise used to fulfill a Computer Science requirement can be used as a CS 4/5XXX elective, including both Independent Study (CS 4974) and Undergraduate Research (CS 4994), except for the following: CS 5040, CS 5044, CS 5045, 5046, 5644, 5664, 5904, 5944, 5974, 5994.

7. **CS Theory Elective.** Students must take one of the following:
CS 4104  Data and Algorithm Analysis  Pre: 3114 (C), (MATH 3034 or MATH 3134)
CS 4114  Introduction to Formal Languages and Automata Theory  Pre: 3114 (C), (MATH 3034 or MATH 3134)
CS 4124  Theory of Computation  Pre: 3114 (C), (MATH 3034 or MATH 3134)
CS 5104  Computability and Formal Languages
CS 5114  Theory of Algorithms  Pre: 3114

8. Capstone Requirement. Students must complete one 4000-level CS capstone course. Students may choose from the courses listed here, or other 4/5000-level CS courses that have received prior approval as fulfilling the capstone requirement.

   CS 4274  Secure Computing Capstone  Pre: 3114 (C), 4264
   CS 4284  Systems & Networking Capstone  Pre: 3114, 3214
   CS 4624  Multimedia, Hypertext and Information Access  Pre: 3114
   CS 4634  Design of Information  Pre: 3114, 3724
   CS 4644  Creative Computing Studio  Pre: 3724
   CS 4664  Data-Centric Computing Capstone  Pre: 3114 (C), 3654
   CS 4704  Software Engineering Capstone  Pre: 3704
   CS 4784  Human-Computer Interaction Capstone  Pre: 3724, 3744
   CS 4884  Computational Biology & Bioinformatics Capstone  Pre: 3824

9. CS Technical Elective. Computer Science majors must satisfy a 3 credit hour technical elective requirement by taking one of:

   1. Any 3-credit CS 3/4/5000-level course meeting the CS 3/4/5XXX elective requirements under (5) above.

   2. Any approved 3000- or 4000-level course in another discipline that has significant technical content relevant to the science or application of computer science can be used as a technical elective.

      a. Requests to have a non-CS course approved as a technical elective are made by submitting a course syllabus to your CS advisor for review prior to enrolling in the course. This includes non-CS Independent Study (4974) and Undergraduate Research (4994) courses.

      b. Below is a listing of non-CS courses that are approved as technical electives.
Computer Science Technical Elective Courses

ACIS/BIT 4554  Networks & Telecommunications in Business (3H, 3C) Pre: ACIS 3504 or BIT 3424
AOE 4434  Introduction to Computational Fluid Dynamics (3H, 3C) Pre: MATH 2214
ART 3704  Topics in Computer Animation (3H, 3C) Pre: ART 2704
BIT 4424  Business Information Visualization & Analytics (3H, 3C) Pre: BIT 2406
BIT 4434  Computer Simulation in Business (3H, 3C) Pre: BIT 3414
BIT 4444  Web-based Decision Support Systems (3H, 3C) Pre: BIT 3444
BIT 4514  Database Technology for Business (3H, 3C) Pre: BIT 3424, BIT 4524
BIT 4544  Advanced Methods in Business Analytics (3H, 3C) Pre: BIT 3444 or ACIS 2504
BIT 4604  Data Governance, Privacy and Ethics (3H, 3C) Pre: BIT 2405 or CMDA 2014 or CS 1114 or CS 1054 or CS 1064
BIT 4614  Information Security (3H, 3C) Pre: BIT 4554 or ACIS 4554
BIT 4624  Cybersecurity Analytics (3H, 3C) Pre: BIT 4614
CMMD 3606  Mathematical Modeling: Methods and Tools II
COMM 4374  New Communications Technology (3H, 3C) Pre: COMM 2084 or COMM 4014
ECE 3544  Digital Design I (3H, 3C) Pre: ECE 2504
ECE 3574  Applied Software Design (3H, 3C) Pre: ECE 2574
ECE 4524  Artificial Intelligence and Engineering Applications (3H, 3C) Pre: ECE 2574, STAT 4714
ECE 4550  Real Time Systems (3H, 3C) Pre: ECE 4534 or CS 3214
ECE 4560  Computer and Network Security Fundamentals (3H, 3C) Pre: CS 3214 or ECE 2504
ECE 4564  Network Application Design (3H, 3C) Pre: ECE 2504, ECE 2574
ECE 4580  Digital Image Processing (3H, 3C)
ECE 4704  Principles of Robotic Systems (3H, 3C) Pre: (ME 3514, STAT 3704) or ECE 2704
GEOG/GEOS 4084  Modeling with GIS (3H, 3C) Pre: GEOG 2084
GEOG 4314  Analysis in GIS (3H, 3C) Pre: GEOG 4084
GEOG 4324  Algorithms in GIS (3H, 3C) Pre: GEOG 4084, CS 1044
MATH 4175  Cryptography I (3H, 3C) Pre: MATH 3034 or MATH 3124 or MATH 3134 or MATH 3144 or MATH 3224 or MATH 4134
MATH 4176  Cryptography II (3H, 3C) Pre: MATH 4175 or (MATH 3034, MATH 3124) or (MATH 3034, MATH 3134) or (MATH 3034, MATH 3144) or (MATH 3034, MATH 3224) or (MATH 3034, MATH 4134) or (MATH 3034, MATH 3134) or (MATH 3124, MATH 3134) or (MATH 3124, MATH 3144) or (MATH 3124, MATH 3224) or (MATH 3124, MATH 4134) or (MATH 3134, MATH 3144) or (MATH 3134, MATH 3224) or (MATH 3134, MATH 4134) or (MATH 3144, MATH 3224) or (MATH 3144, MATH 4134) or (MATH 3224, MATH 4134)
MATH 4445  Introduction to Numerical Analysis (3H, 3C) Pre: MATH 2406H or (CMDA 2005, CMDA 2006) or (MATH 2214 or MATH 2214H), (MATH 2224 or MATH 2224H) or (MATH 2204 or MATH 2204H)
MATH 4454  Applied Mathematical Modeling (3H, 3C) Pre: MATH 3214
ME 4524  Robotics and Automation (3H, 3C) Pre: ME 2004, ME 3524, ME 3534; Co: ME 4584
MUS 3064  Digital Sound Manipulation (3H, 3C)
MUS 3065  Computer Music & Multimedia I (3H, 3C) Pre: MUS 2054
MUS 3066  Computer Music & Multimedia II (3H, 3C) Pre: MUS 2054, MUS 3065
PHYS 4755  Intro to Computational Physics (3H, 3C) Pre: PHYS 2306, CS 1044