Student's Name:_____

E-mail Address:_____

CSU ID Number:_____

Natural Sciences – Physical Sciences Concentration

Curriculum Checksheet

120 Credits

Note to the Student: This check-sheet describes the curricular requirements for the Bachelor of Science in Natural Science with a concentration in Physical Sciences. The physical science concentration begins with two semesters each of calculus, chemistry, and physics, plus a semester of biological science. Students then complete the major by earning two minors selected from biochemistry, chemistry, computer science, geology, mathematics, physics or statistics.

Requirements		Course(s) Taken
____Written Communication (1A)	3	_____
Mathematics (1B)		
____MATH 155	4	
____MATH 255	4	
-OR-		
____MATH 160	4	
____MATH 161	4	
____Advanced Writing (2)	3	_____
Biological/Physical Sciences (3A)		
____CHEM 111/112	4/1	
____CHEM 113/114	3/1	
____PH 141	5	
____PH 142	5	
____LIFE 102	4	
-OR-		
____BZ 104/105	3/1	
-OR-		
____BZ 110/111	3/1	
-OR-		
____BZ 120	4	
____Arts/Humanities I (3B)	3	_____
____Arts/Humanities II (3B)	3	_____
____Social/Behavioral Sciences (3C)	3	_____
____Historical Perspectives (3D)	3	_____
____Global/Cultural Awareness (3E)	3	_____
____Using Competencies (4A)		_____
____Building Foundations/Perspectives (4B)		_____
____Capstone Course (4C)		_____
____STAT 301 Intro to Stats	3	_____

Minor #1:_____

Course(s) Taken	Credits
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Minor #2:_____

Course(s) Taken	Credits
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Upper Division Credits (42 credits)

Course Taken/Credits	Course Taken/Credits

Using Competencies (4A) Courses

Biochemistry:
  BC 401 Comprehensive Biochemistry I (3)
Chemistry:
  CHEM 335 Introduction to Analytical Chemistry (3)
Computer Science:
  CS 314 Software Engineering (3)
  CS 440 Introduction to Artificial Intelligence (4)
  CS 464 Principles of Human-Computer Interaction (4)
Geology:
  GEOL 344 Stratigraphy and Sedimentology (4)
  GEOL 366 Sedimentary Petrology and Geochemistry (4)
  GEOL 376 Geologic Field Methods (3)

Mathematics:
  MATH 369 Linear Algebra (3)
  MATH 360 Mathematics of Information Security (3)
  MATH 366 Introduction to Abstract Algebra (3)
  MATH 466 Abstract Algebra (3)
Physics:
  PH 451 Introductory Quantum Mechanics I (3)
Statistics:
  STAT430 Probability and Mathematical Statistics II (3)
  STAT 472 Statistical Consulting Capstone (3)

Building Foundations & Perspectives (4B) Courses

Biochemistry:
  BC 403 Comprehensive Biochemistry II (3)
Chemistry:
  CHEM 476 Physical Chemistry II (3)
  CHEM 473 Foundations of Physical Chemistry (4)
Computer Science:
  CS 320 Algorithms – Theory & Practice (3)
  CS 464 Principles of Human-Computer Interaction (4)

Geology:
  GEOL 364 Igneous and Metamorphic Petrology (4)
  GEOL 366 Sedimentary Petrology and Geochemistry (4)
  GEOL 372 Structural Geology (4)
Mathematics:
  MATH 317 Advanced Calculus of One Variable (4)
  MATH 417 Advanced Calculus I (3)
Physics:
  PH 451 Introductory Quantum Mechanics I (3)
Statistics:
  STAT 472 Statistical Consulting Capstone (3)

Capstone (4C) Courses

Biochemistry:
  None
Chemistry:
  None
Computer Science:
  CS 410 Introduction to Computer Graphics (4)
  CS 414 Object-Oriented Design (4)
  CS 420 Analysis of Algorithms (4)
  CS 430 Database Systems (4)
  CS 435 Introduction to Big Data (4)
  CS 440 Introduction to Artificial Intelligence (4)
  CS 445 Introduction to Machine Learning (4)
  CS 453 Introduction to Compiler Construction (4)
  CS 454 Principles of Programming Languages (4)
  CS 455 Introduction to Distributed Systems (4)
  CS 457 Networks and the Internet (4)
  CS 464 Principles of Human-Computer Interaction (4)
  CS 470 Computer Architecture (4)
  CS 475 Parallel Programming (4)

Geology:
  GEOL 376 Geologic Field Methods (3)
  GEOL 436 Geology Summer Field Course (6)
Mathematics:
  MATH 417 Advanced Calculus I (3)
  MATH 425 History of Mathematics (3)
  MATH 435 Projects in Applied Mathematics (3)
  MATH 466 Abstract Algebra I (3)
Physics:
  None
Statistics:
  STAT 472 Statistical Consulting Capstone (3)

Minor Requirements

Biochemistry (22 – 23)

LIFE 201B Introductory Genetics (3)

LIFE 203 Introductory Genetics Laboratory (2)

LIFE 210 Introductory Eukaryotic Cell Biology (3)

LIFE 212 Introductory Cell Biology Laboratory (2)

BC 401 Comprehensive Biochemistry I (3)   4A

BC403 Comprehensive Biochemistry II (3)   4B

BC404 Comprehensive Biochemistry Lab (2)   4B

BC 411 Physical Biochemistry (4)
-OR-
BC 463 Molecular Genetics (3)
-OR-
BC 465 Molecular Regulation of Cell Function (3)

BC 493 Senior Seminar (1)

Chemistry (24)

A minimum grade of C- is required in all of the chemistry courses required for the minor in chemistry.

CHEM 111 General Chemistry I (4)

CHEM 112 General Chemistry Laboratory I (1)

CHEM 113 General Chemistry II (3)

CHEM 114 General Chemistry Laboratory II (1)

Students must take 15 upper division chemistry courses with the following requirements:

1. Courses must come from at least two different areas of chemistry (analytical, chemical biology, materials chemistry, inorganic, organic or physical chemistry).
2. Two courses must contain a lab component (CHEM 334, 344, 345 or 346, 431, 433, 440, 462, 475, 477).
3. A maximum of 3 credits are allowed for CHEM 487, 495 and 498.

Analytical:	CHEM 334, 335 (4A), 338, 380A3, 431, 433
Chemical Biology:	BC 351 or BC 401, CHEM 320
Inorganic:	CHEM 261, 461, 462
Materials Chemistry:	CHEM 311
Organic:	CHEM 341, 343, 344, 345, 346, 440
Physical:	CHEM 473 (4B), 474, 475, 476 (4B), 477
Other:	CHEM 301, 487, 493, 495, 498

Computer Sciences (24)

A minimum grade of C is required in all courses required for the minor, and their prerequisites.

CS 163 No Prior Programming Experience (4)
-OR-
CS164 Prior Programming Experience

CS 165 Data Structures (4)

CS 220 Discrete Structures and Their Applications (4)
-OR-
CS 253 Software Development with C++ (4)
-OR-
CS 270 Computer Organization (4)

Students must take 12 upper division computer science courses. Please note, some of these courses will have prerequisites that are not listed above.

Mathematics (23)

A minimum grade of C is required in all mathematics, statistics and computer science courses required for the minor in mathematics.

MATH 155 Calculus for Biological Scientists I (4)
-AND-
MATH 255 Calculus for Biological Scientists II (4)
-OR-
MATH 160 Calculus for Physical Scientists I (4)
-AND-
MATH 161 Calculus for Physical Scientists II (4)
-OR-
MATH 160 Calculus for Physical Scientists I (4)
-AND-
MATH 271 Applied Mathematics for Chemists I (4)

Students must take 6-7 credits from the following:

MATH 229 Matrices and Linear Equations (3)
-OR-
MATH 261 Calculus for Physical Scientists III (3)
-OR-
MATH 272 Applied Mathematics for Chemists II (4)
-OR-
MATH, STAT or CS upper division courses (3-4)

Students must take 9 credits of upper division mathematics courses.

Minor Requirements

Physics (22)

A minimum grade of C- is required in all physics courses required for the minor in physics.

PH 141 Physics for Scientists & Engineers I (5)

PH 142 Physics for Scientists & Engineers II (5)

PH 314 Introduction to Modern Physics (4)

Students must take 8 credits of upper division physics courses:

PH 315 Modern Physics Laboratory (2)

PH341 Mechanics (4)*

PH 351 Electricity and Magnetism (4)*

PH 353 Optics & Waves (4)

PH 361 Physical Thermodynamics (3)

PH 425 Advanced Physics Laboratory (2)*

PH 451 Introductory Quantum Mechanics I (3)*   4A, 4B

PH 452 Introductory Quantum Mechanics II (3)*

PH 462 Statistical Physics (3)*

*require MATH340 as a prerequisite.

Applied Statistics (21)

A minimum grade of C must be achieved in all statistics courses (STAT prefix and joint-listed) required for the minor in applied statistics.

STAT 301 Introduction to Statistical Methods (3)
-OR-
STAT 307 Introduction to Biostatistics (3)
-OR-
STAT 311 Statistics for Behavioral Sciences I
-OR-
STAT 315 Statistics for Engineers and Scientists (3)

STAT 305 Sampling Techniques (3)
-OR-
STAT 312 Statistics for Behavioral Sciences II (3)

STAT 341 Statistical Data Analysis I (3)

STAT 342 Statistical Data Analysis II (3)

Approved Electives (9)

Statistics (21-22)

A minimum grade of C must be achieved in all statistics courses (STAT prefix and joint-listed) required for the minor in applied statistics.

STAT 301 Introduction to Statistical Methods (3)
-OR-
STAT 307 Introduction to Biostatistics (3)
-OR-
STAT 311 Statistics for Behavioral Sciences I
-OR-
STAT 315 Statistics for Engineers and Scientists (3)

STAT 358 Introduction to Statistical Computing in SAS (3)
-OR-
STAT 400 Statistical Computing (3)
-OR-
STAT 420 Probability and Mathematical Statistics I (3)
-OR-
STAT 440 Bayesian Data Analysis (3)

STAT 305 Sampling Techniques (3)
-OR-
STAT430 Probability and Mathematical Statistics II (3)   4A
-OR-
STAT 460 Applied Multivariate Analysis (3)

STAT 158 Introduction to R Programming (1)

STAT 341 Statistical Data Analysis I (3)

STAT 342 Statistical Data Analysis II (3)

Approved Electives (6)

Geology (21)

GEOL 110 Introduction to Geology – Parks & Monuments (3)
GEOL 121 Introductory Geology Laboratory (1)
-OR-
GEOL 120 Physical Geology (3)
GEOL 121 Introductory Geology Laboratory (1)
-OR-
GEOL 122 Geology of Our Environment (3)
GEOL 121 Introductory Geology Laboratory (1)
-OR-
GEOL 124 Geology of Natural Resources (3)
GEOL 121 Introductory Geology Laboratory (1)
-OR-
GEOL 150 Physical Geology (4)

GEOL 154 Historical and Analytical Geology (4)

Students must take 13 of GEOL coursework, of which at least 12 credits must be upper division.