2.2 Computer Science

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Program Description:
The goal of the Computer Science major at Behrend is to produce graduates with a firm foundation in the fundamentals of computer science along with a significant background in one or more of the natural sciences to provide context. Students are encouraged to pursue a minor in one of the natural sciences (biology, chemistry, physics), math, statistics, or game development. Students prepare for the major by taking lower-division courses in programming, discrete math, computer organization, and data communications. They then complete upper-division courses in data structures and algorithms, data base management systems, net-centric programming, programming language principles, and operating systems and systems programming.

Graduates of this program will be prepared for a wide variety of computer-oriented careers in science, business, industry and government, as well as for graduate study in computer science or in computationally intensive disciplines that require the practical application of computer science concepts and techniques to solving problems.

The educational objectives of the program are to produce graduates who within three years of graduation are able to:

- be employed as a practicing computing professional in fields such as design, research, development, testing, maintenance, and manufacturing;
- assume positions of leadership and responsibility within an organization; and
- progress through advanced degree or certificate programs in engineering, science, business, and other professionally related fields.

Entrance to Major requirement:
In addition to the Carnegie unit and minimum GPA requirements described by University policies, all students applying for entrance to any of the engineering majors at Behrend College must have at least a 2.0 cumulative GPA by the end of the semester prior to applying for entrance to the major and have completed, with a minimum grade of C: MATH 140 GQ(4), MATH 141 GQ(4), CMPSC 121 GQ(3), CMPSC 122 (3) and one of the following: BIOL 110 GN(4), or CHEM 110 GN(3) and CHEM 111 GN(1) or PHYS 211 GN(4). These courses must be completed by the end of the semester during which the admission to major process is carried out.

Recommended Academic Plan – Computer Science

(CMPBD at Penn State Erie, The Behrend College) Effective Fall 2016

Semester 1	Credits	Semester 2	Credits
***MATH 140 (GQ) Calculus with Analytic Geometry I** *	4	***MATH 141 (GQ) Calculus with Analytic Geometry II** *	**4**
***Science Sequence Course** (GN) *	4	*Science Sequence Course (GN)*	4
ENGL 015 or 030 (GWS) Rhetoric and Composition or Honors Freshmen Composition	3	**CMPSC 122 Intermediate Programming ***	**3**
***CMPSC 121 (GQ) Introduction to Programming Techniques **	3	GA/GH/GS General Education Selection	3
First-Year Seminar	1	Health and Physical Activity (GHA)	1.5
Total Credits:	15	Total Credits:	15.5
Semester 3	**Credits**	**Semester 4**	**Credits**
CMPSC 221 Object Oriented Programming with Web-Based Applications	3	**CMPSC 360 Discrete Mathematics for Computer Science**	3
MATH 220 (GQ) Matrices	2	**STAT 301 Statistical Analysis I**	3
Science Sequence Course (GN)	2-3	Science Elective	3
GA/GH/GS General Education Selection	3	*ENGL 202C (GWS) Effective Writing: Technical Writing*	3
CAS 100 (GWS) Effective Speech	3	GA/GH/GS General Education Selection	3
Health and Physical Activity (GHA)	1.5		
Total Credits:	14.5-15.5	Total Credits:	15
Semester 5	**Credits**	**Semester 6**	**Credits**
CMPSC 335 Fundamentals of Communications Networks Or CMPEN 461 Communications Networks	3	**CMPSC 421 Net-Centric Programming**	3
CMPSC 312 Computer Organization and Architecture	3	**CMPSC 474 Operating Systems and Systems Programming**	3
CMPSC 465 Data Structures and Algorithms	3	Computing Elective	3
CMPSC 431 Database Management Systems	3	Supporting and Related Area	3
Science Elective	3	Science Elective	3
Total Credits:	15	Total Credits:	15
Semester 7	**Credits**	**Semester 8**	**Credits**
CMPSC 461 Programming Language Concepts	3	**CMPSC 485W Computer Science Senior Project II**	3
CMPSC 484 Computer Science Senior Project I	2	Computing Elective	3
SWENG 411 Software Engineering (Computing Elective)	3	Science Elective	3
Supporting and Related Area	3	GA/GH/GS General Education Selection	3
Science Elective	3	GA/GH/GS General Education Selection	3
GA/GH/GS General Education Selection	3		
Total Credits:	17	Total Credits:	15

Total Credits – 122 or 123

- An asterisk (*) indicates an entrance to major requirement.
- **Bold type** indicates courses requiring a quality grade of C or better.
- *Italics* indicate courses that satisfy both major and General Education requirements.
- ***Bold Italics*** indicates courses requiring a quality grade of C or better and that satisfy both major and General Education requirements.

- GWS, GHA, GQ, GN, GA, GH, and GS are codes used to identify General Education requirements.
- US, IL, and US;IL are codes used to designate courses that satisfy University United States/International Cultures requirements. Students must complete 3 credits in US and 3 credits in IL. If a student takes a 3 credit course that is both US and IL, to complete the requirement, he/she must take another 3-credit course that is US, IL, or both US and IL. Education abroad courses and other credit-bearing experiences such as internships that meet this requirement, will be designated US, IL or both US and IL.
- W is the code used to designate courses that satisfy University Writing Across the Curriculum requirements.
- Students who have not met the admission requirement of two units of a high school foreign language must complete a college level-one foreign language within their first 60 credits.
- Students must earn a minimum of 122 or 123 credits for graduation.

Scheduling patterns for courses not taught each semester: Some major requirements will be offered only once a year. Some upper level courses are offered in an alternate year pattern. Consult an adviser for suggestions on scheduling them.
Fall only courses include: CMPSC 312, CMPSC 335, CMPSC 461, CMPSC 431W, CMPSC 474, CMPSC 484
Spring only courses include: CMPSC 421, CMPSC 485W

Academic Advising Notes: The courses listed in (1) to (4) below are all counted as **additional courses** in the university Bulletin and LionPath.

(1) Science Sequence (10 or 11 credits)
Students need to complete one of the following three semester science (GN) course sequences which will also count toward their general education except CHEM 210.

1. (Biology) CHEM 110(3), BIOL 110S(4) and BIOL 220W(4) or BIOL 230W(4) or BIOL 240W(4)
2. (Chemistry) CHEM 110(3), CHEM 111(1), CHEM 112(3), CHEM 113(1), and CHEM 210(3)
3. (Physics) PHYS 211(4), PHYS 212(4), and PHYS 213(2) or PHYS 214(2)

(2) Science Elective (15 credits)
It is strongly suggested (but not required) that students follow one of the computer science natural science, math, or statistics minors in selecting their science electives.

Students may choose from the following courses:

- ASTRO 291 or higher; BIOL 110 or higher; CHEM 110 or higher; CMPSC 312 or higher
- GEOG 160 or higher; MATH 200 level or higher; METEO 101 or higher
- PHYS 211 or higher except PHYS 250 or PHYS 251
- STAT 300 level or higher

(3) Computing Elective (9 credits)
Students may select courses from CMPSC 312 or higher, SWENG411 or higher, or CMPEN courses.

(4) Supporting and Related Areas (6 credits)
All 300 and 400-level courses in CMPSC (including CMPSC 494 – Research, CMPSC 495 – Internship, and/or CMPSC 496 Independent Study), GAME, MIS, MATH, STAT, BIOL, CHEM, PHYS, ACCTG, ECON, FIN, PSYCH, and ROTC

COMPUTER SCIENCE (B.S.)