Software Engineering

Penn State Erie, The Behrend College (SE BD)

Entrance 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 The 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: CHEM 110 GN(3), MATH 140 GQ(4), MATH 141 GQ(4), and 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.

For the B.S. degree in Software Engineering, a minimum of 127 credits is required. A student enrolled in this major must earn a grade of C or better in each 300- and 400-level course in the major.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

Part I

GENERAL EDUCATION: 45 credits
(21 of the 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 1 credit

1.GA/GH/GS courses total 18 credits which can be in 6-6-6 or 9-6-3 credit distributions among the three categories of GA/GH/GS in any order
2. Take US/IL courses which are also counted as GA/GH/GS courses

Part II

REQUIREMENTS FOR THE MAJOR: 102-103 credits
(This includes 21 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GWS courses; 3 credits of GS courses.)

two are combined as CMPEN270

PRESCRIBED COURSES (87 credits)
CHEM 110 GN(3)[1], CHEM 111 GN(1), CMPSC 121 GQ(4), CMPSC 122(3)[1] (Sem: 1-2)
MATH 140 GQ(4)[1], MATH 141 GQ(4)[1], MATH 220 GQ(2-3), MATH 250(3), PHYS 211 GN(4)[1], PHYS 212 GN(4) (Sem: 1-4)
CMPEN 271(3)[1], CMPEN 275(1), CMPSC 360(3)[1], ENGL 202C GWS(3), MIS 336(3)[1], SWENG 311(3)[1] (Sem: (3-4)
CMPEN 441(3)[1], CMPSC 461(3)[1], CMPSC 465(3)[1], STAT 301 GQ(3)[1], SWENG 452W(3)[1], SWENG 411(3)[1], SWENG 421(3)[1], SWENG 431(3)[1] Sem: (5-6)
CMPEN 351(3)[1], CMPEN 461(3)[1], SWENG 480(3)[1], SWENG 481(3)[1], MGMT 301(3)[1] (Sem: (7-8)

Alternative: CMPSC431

ADDITIONAL COURSES (6-7 credits)
ECON 102 GS(3) or ECON 104 GS(3) (Sem: 3-4)
E E 210(4) or E E 211(3) (Sem: 3-4)

also count as GS credits

SUPPORTING COURSES AND RELATED AREAS (9 credits)
Select 9 credits of technical elective courses from school-approved list. (Sem: 6-8)

6 credits from primary list and 3 credits from the second list on the RAP

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

*Part I: GenEd courses; Part II: major courses. Some course count in both.

2.10 Software Engineering

Chair: Dr. Meng Su
814-898-6261
mus11@psu.edu

Program Description:
This major provides students with a strong foundation in software engineering through a combination of classroom study, software development experience, and design projects. Design, analysis, verification, and maintenance of software systems are stressed. Built upon a core of science and mathematics courses, this major has the objective of educating graduates to be problem solvers. Students acquire the ability to work as members of a team toward successful attainment of a common goal, preparing them for work in industry or further study in graduate school. In addition, written and oral communication skills are developed from an early stage, culminating in a senior design project that stresses communication as well as engineering content.

In addition to completing a broad-based science core in mathematics, chemistry, and physics, students pursue their interest in software engineering by studying principles in computer programming, object-oriented design, software design, software verification, information systems, operating systems, and data communications. The program has a capstone software design project that requires students to work together on teams to design, plan, manage, and implement a software design project.

The educational objectives of the Software Engineering Program are to produce graduates, who within three years of graduation are able to:

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

This program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place Suite 1050, Baltimore, MD 21202-4012, Telephone 410-347-7700, and www.abet.org

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: CHEM 110 GN (3), MATH 140 GQ (4), MATH 141 GQ (4), and 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 – Software Engineering

(SE BD at Penn State Erie, The Behrend College) – Effective Program Year Fall 2015

Semester 1	Credits	Semester 2	Credits
MATH 140 (GQ) Calculus With Analytic Geometry I*	4	***MATH 141 (GQ) Calculus With Analytic Geometry II****	4
CHEM 110 (GN) Chemical Principles I*	3	***PHYS 211 (GN) General Physics: Mechanics****	4
CHEM 111 (GN) Experimental Chemistry I	1	**CMPSC 122 Intermediate Programming**	3
ENGL 015 or 030 (GWS) Rhetoric and Composition or Honors	3	*MATH 220 (GQ) Matrices*	2
CMPSC 121 (GQ) Introduction to Programming Techniques	3	*ECON 102 or 104 (GS) Intro. Micro-Macroeconomics Analy. & Policy*	3
PSU 007 First-Year Seminar	1		
Total Credits:	15	Total Credits:	16
Semester 3	**Credits**	**Semester 4**	**Credits**
SWENG 311 Object Oriented Software Design & Construction	3	**CMPSC 360 Discrete Mathematics for Computer Science**	3
MATH 250 Ordinary Differential Equations	3	**CMPEN 271 Introduction to Digital Systems** [A 1]	3
CAS 100 (GWS) Effective Speech	3	CMPEN 275 Digital Design Laboratory [A 1]	1
PHYS 212 (GN) General Physics: Electricity & Magnetism	4	E E 210/211 Circuits & Devices or Circuits & Power Distribution	3
Arts (GA), Humanities (GH), or Social & Behavioral Science (GS)	3	**STAT 301 Statistical Analysis I**	3
		ENGL 202C (GWS) Effective Writing: Technical Writing	3
Total Credits:	16	Total Credits:	16
Semester 5	**Credits**	**Semester 6**	**Credits**
CMPEN 351 Microprocessors	3	**SWENG 452W (GWS) Embedded Real Time Systems**	3
SWENG 411 Software Engineering	3	**SWENG 431 Software Verification, Validation, & Testing**	3
CMPEN 441 Operating Systems	3	**CMPSC 465 Data Structure & Algorithms**	3
CMPSC 431W Database Management Systems **Or MIS 336 Database Management Systems**	3	**SWENG 421 Software Architecture**	3
Technical Elective (300, 400-level)	3	Arts (GA), Humanities (GH), or Social & Behavioral Science (GS)	3
Health & Physical Activity (GHA)	1.5		
Total Credits:	16.5	Total Credits:	15
Semester 7	**Credits**	**Semester 8**	**Credits**
CMPEN 461 Communications Network	3	**MGMT 301 Basic Management Concepts**	3
CMPSC 461 Programming Language Concepts	3	**SWENG 481 Software Engineering Project**	3
SWENG 480 Software Engineering Design	3	**Technical Elective (300, 400-level)**	3
Technical Elective (300, 400-level)	3	Arts (GA), Humanities (GH), or Social & Behavioral Science (GS)	3
Arts (GA), Humanities (GH), or Social & Behavioral Science (GS)	3	Arts (GA), Humanities (GH), or Social & Behavioral Science (GS)	3
Health & Physical Activity (GHA)	1.5		
Total Credits:	16.5	Total Credits:	15

Total Credits – 126

- An asterisk (*) indicates an entrance to major requirement.
- **Bold type** indicates courses requiring a quality grade of C or better.
- *Italics* indicates 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. This is a pre-admission requirement – credits will not count toward degree requirements.

Scheduling patterns for courses not taught each semester:

Program Notes:

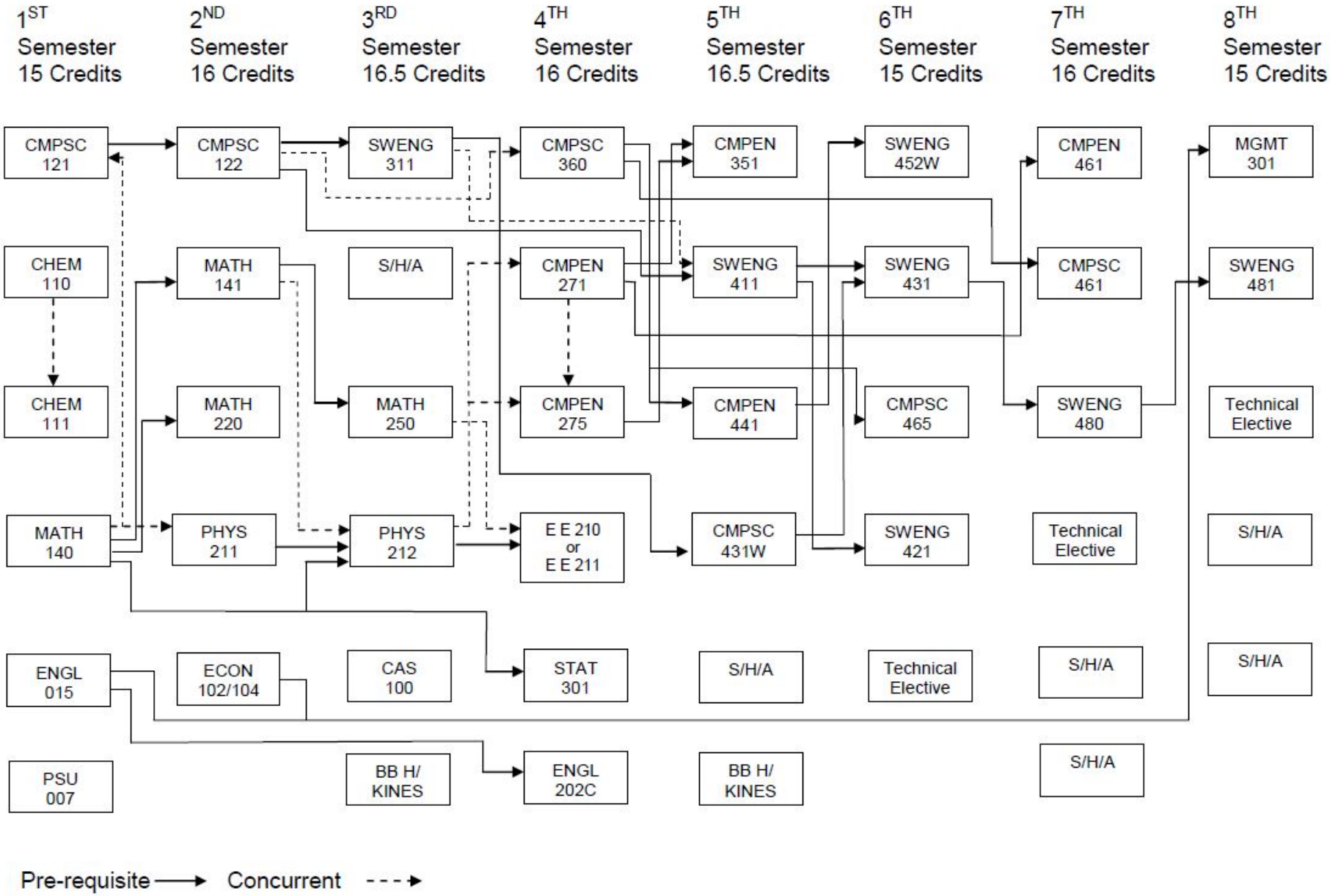
- Only students who have gone through the entrance to major process and have been accepted into this major may register for junior and senior-level courses.
- Students can take either MIS 336 or CMPSC431 as the major required course. If a student takes both MIS 336 and CMPSC431, the latter one is considered as the technical elective.

Academic Advising Notes:

[A] CMPEN 270 can be substituted for CMPEN 271 and CMPEN 275.

[1] CMPEN 271, CMPEN 275, and CMPSC 360 must be completed prior to the junior year to ensure that fall semester junior year prerequisites are met.

SOFTWARE ENGINEERING (B.S.)



School-Approved Electives for Software Engineering

Technical electives allow students to choose areas of interest to explore. Technical electives come in two flavors, primary and secondary. Primary technical electives are those courses offered to CSSE majors which are not required for the SE BD major. Secondary technical electives are offered outside your home department and give you broader latitude. **Students must complete at least two primary technical electives, and, at most, one secondary technical elective.**

*Exceptions to the above policy will be granted to students who **successfully** complete a minor in one of the areas listed in part 5: Academic Minors*.

Primary Technical Electives			
Course	**Credits**	**Name**	**Offered**
		Any 300-400 level EE course	
Any 300-400 level CMPEN course not already required for the major			
Any 400 level CMPSC course not already required for the major			
Any 300-400 level SWENG course not already required for the major			
GAME 450	3	Advanced GAME Programming	
GAME 480	3	GAME Development Project	
Secondary Technical Electives			
SWENG 395+495	(3:3:0)	Internship	Fall/Spring
MIS 430	(3:3:0)	Systems Analysis	Fall/Spring
MIS 435	(3:3:0)	Systems Design and Implementation	Fall/Spring
MIS 445	(3:3:0)	Management Report Systems	Fall
MIS 470	(3:3:0)	Advanced Applications Development	Spring
MGMT 409	(3:3:0)	Project Management for Engineers	
PSYCH 444	(3:3:0)	Engineering Psychology	Fall
ECON 481	(3:3:0)	Business Forecasting Techniques	Spring
ECON 485	(3:3:0)	Econometric Techniques	Fall
MATH 455	(3:3:0)	Introduction to Numerical Analysis I	Fall
MATH 456	(3:3:0)	Introduction to Numerical Analysis II	Spring (even years)
ENTR 430	(3:3:0)	Entrepreneurship & New Product Dev.	Fall