# **Software Engineering Electives**

February 2013

Theory of Linear Algebra

Math 317

Package   Pack	SOFTWARE ENGINEERING ELECTIVES (6 credits)						
Set 409 Software Requirements Engineering F 3 ComS 309  Set 412 Format Aspects of Specification and Verification 5 3 SE 319, ComS 309  Set 416 Software Evolution and Maintenance F 3 ComS 309  Set 417 Software Testing 5 3 SE 319, ComS 309  Set 417 Software Testing 5 3 SE 319, ComS 309  Set 418 Software Tools for Large Scale Data Analysis 5 4 ComS 352 or CprE 308, ComS 309  Set 419x Software Tools for Large Scale Data Analysis 5 4 ComS 352 or CprE 308, ComS 309  Set 342 Principles of Programming Languages F/S 3 ComS 310, ComS 330 or CPR E 310, either ComS 309, ComS 362 or ComS 363 or CPR E 310, either ComS 309, ComS 362 or ComS 363 or CPR E 310, either ComS 309, ComS 362 or ComS 363 or CPR E 310, either ComS 309, ComS 362 or ComS 363 or CPR E 310, either ComS 309, ComS 362 or ComS 363 or CPR E 310, either ComS 309, ComS 362 or ComS 363 or CPR E 310, either ComS 309, ComS 362 or ComS 362 or ComS 363 or CPR E 310, either ComS 309, ComS 363 or ComS 364 ComS 311, ComS 363, Engl 250, SpCm 212  ComS 430 Advanced Programming Tools F 3 ComS 311, 362 or 363, Engl 250, SpCm 212  ComS 454/554 Distributed & Network Operating Systems F 3 ComS 311, Som 363, Engl 250, SpCm 212  ComS 454/554 Distributed & Network Operating Systems Alt. S 3 ComS 311, ComS 363, Engl 250, SpCm 212  ComS 456 Fundamental Concepts in Computer Networking S 3 ComS 352  ComS 437X Computer Game and Media Programming S 3 ComS 352 or CprE 308, ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change  COURSE DESCRIPTION SEM C ComS 352 or CprE 308, ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change  F/S/SS 3 Muth 166 or 160H  MATH ELECTIVE (3 credits)  PREREQUISITES  COURSE DESCRIPTION SEM C Check latest catalog for complete lists  Free semester courses are offered may change  COURSE DESCRIPTION SEM C Check latest catalog for complete lists  Math 1307 Matrices and Linear Algebra F F/S/SS 3 Auth 166 or 160H 201 or experience with proofs	The semester	courses are offered may change			PREREQUISITES		
Set 412   Format Aspects of Specification and Verification   S   3   Set 319, ComS 309	COURSES	DESCRIPTION	SEM	CR	Check latest catalog for complete lists		
SE 416 Software Evolution and Maintenance F 3 ComS 309  SE 417 Software Testing S 3 SE 319, ComS 309  SE 418 Software Tools for Large Scale Data Analysis S 4 ComS 352 or CprE 308; ComS 309  SE 342 Principles of Programming Languages F/S 3 ComS 321 or CprE 381; ComS 330 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 362 or ComS 363 or CPR E 310; either ComS 309, ComS 363 or CPR E 310; either ComS 309, ComS 364 or CPR E 310; either ComS 309, ComS 364 or CPR E 310; either ComS 309, ComS 364 or CPR E 310; either ComS 309, ComS 364 or CPR E 310; either ComS 309, ComS 364 or CPR E 310; either ComS 309, ComS 364 or CPR E 310; either ComS 309, ComS 364 or CPR E 310; either ComS 309, ComS 364 or CPR E 310; either ComS 309, ComS 364 or CPR E 310; either ComS 309, ComS 364 or CPR E 310; either ComS 309, ComS 365 or CPR 308; ComS 309, ComS 366 or CPR 208; ComS 366 or C	SE 409	Software Requirements Engineering	F	3	ComS 309		
SE 417 Software Testing 5 3 SE 319, ComS 309  SE 418x Software Tools for Large Scale Data Analysis 5 4 ComS 352 or CprE 308; ComS 309  SE 342 Principles of Programming Languages F/S 3 ComS 321 or CprE 308; ComS 330 or CPR E 310; either ComS 309, ComS 362 or ComS 363  TECHNICAL ELECTIVE (3 credits)  The semester courses are affered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  CprE 425 Intro to Parallel Algorithms & Prog. F 4 ComS 311; CprE 308 or ComS 322  CprE 436 O Distributed Systems Analysis F 3 CprE 308 or ComS 352  CprE 4575 Distributed Systems F 3 CprE 308 or ComS 352  CprE 458/558 Real-Time Systems F 3 CprE 308 or ComS 352  ComS 454/554 Distributed & Network Operating Systems Alt. S 3 ComS 311; ComS 352, Engl 250; SpCm 212  ComS 461 Database System Concepts & Internals F 3 ComS 312; ComS 352, Engl 250; SpCm 212  ComS 437X Computer Game and Media Programming S 3 ComS 352  ComS 437X Computer Game and Media Programming S 3 ComS 352 or CprE 308; ComS 309  ECON ELECTIVE (3 credits)  The semester courses are affered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  PRES	SE 412	Format Aspects of Specification and Verification	S	3	SE 319, ComS 309		
SE 419x Software Tools for Large Scale Data Analysis S 4 ComS 352 or CprE 308; ComS 309  SE 342 Principles of Programming Languages F/S 3 ComS 321 or CprE 381; comS 330 or CPR E 310; either ComS 309, ComS 362 or ComS 362 or ComS 363  TECHNICAL ELECTIVE (3 credits)  The semester courses are offered may change  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  CprE 426 Intro to Parallel Algorithms & Prog. F 4 ComS 311; CprE 308 or ComS 321  ComS 430 Advanced Programming Tools F 3 ComS 311, 362 or 363, Engl 250, SpCm 212  CprE 450 Distributed Systems and Middleware S 3 CprE 308 or ComS 352  CprE 458 Real-Time Systems F 3 CprE 308 or ComS 352  CprE 458/558 Real-Time Systems F 3 CprE 308 or ComS 352  ComS 454/554 Distributed & Network Operating Systems Alt. S 3 ComS 311; ComS 311; ComS 352, Engl 250, SpCm 212  ComS 461 Database System Concepts & Internals F 3 ComS 311; ComS 352, Engl 250, SpCm 212  ComS 437X Computer Game and Media Programming S 3 ComS 352  ComS 437X Computer Game and Media Programming S 3 ComS 352 or CprE 308; ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Econ 101 Principles of Microeconomics F/S/SS 3 Fcon 101 (Recommended)  E 305 Engineering Economic Analysis F/S/SS 3 Fcon 101 (Recommended)  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  MATH 166 or 166H; 201 or experience with proofs  MATH 168 or 166H; 201 or experience with proofs  MATH 160 or 166H; 201 or experience with proofs  MATH 160 or 166H; 201 or experience with proofs	SE 416	Software Evolution and Maintenance	F	3	ComS 309		
TECHNICAL ELECTIVE (3 credits)  TECHNICAL ELECTIVE (3 credits)  TECHNICAL ELECTIVE (3 credits)  TECHNICAL ELECTIVE (3 credits)  The semester course are offered may change  COURSES  DESCRIPTION  SEM CR Check latest catalog for complete lists  PREREQUISITES  PREREQUISITES  PREREQUISITES  PREREQUISITES  PREREQUISITES  PREREQUISITES  COURSES  DESCRIPTION  SEM CR Check latest catalog for complete lists  F 4 Com5 311; Cpr 5 308 or Com5 321  Com5 430  Advanced Programming Tools  F 3 Com5 311, 362 or 363, Engl 250, SpCm 212  Cpr 4580  Cpr 4580  Distributed Systems and Middleware  S 3 Com5 311; Com5 352, Engl 250, SpCm 212  Com5 454/554  Distributed & Network Operating Systems  Alt. S 3 Com5 311; Com5 352, Engl 250, SpCm 212  Com5 454/554  Distributed & Network Operating Systems  Alt. S 3 Com5 311; Com5 352, Engl 250, SpCm 212  Com5 461  Database System Concepts & Internals  F 3 Com5 312; Com5 363, Engl 250, SpCm 212  Com5 486  Fundamental Concepts in Computer Networking  S 3 Com5 312; Com5 363, Engl 250, SpCm 212  Com5 437X  Computer Game and Media Programming  S 3 Com5 312; Com5 363, Engl 250, SpCm 212  Com5 437X  Computer Game and Media Programming  S 3 Com5 362, or permission of the instructor, co-requisite Com5 356  Com5 335  Econ 101  Principles of Microeconomics  F /5/55  PREREQUISITES  COURSES  DESCRIPTION  SEM CR Check latest catalog for complete lists  MATH ELECTIVE (3 credits)  The semester course are offered may change  PREREQUISITES  PREREQUISITES  PREREQUISITES  PREREQUISITES  MATH 166 or 166H  MATH ELECTIVE (3 credits)  The semester course are offered may change  PREREQUISITES  Adath 166 or 166H  MATH ELECTIVE (3 credits)  The semester course are offered may change  PREREQUISITES  Adath 166 or 166H; 201 or experience with proofs  Math 307	SE 417	Software Testing	S	3	SE 319, ComS 309		
TECHNICAL ELECTIVE (3 credits)  The semester courses are offered may change  COURSES  DESCRIPTION  SEM CR Check latest catalog for complete lists  ComS 4300 Advanced Programming Tools  F 3 ComS 311; Cpr£ 308 or ComS 321  ComS 4300 Advanced Programming Tools  F 3 ComS 311, 362 or 363, Engl 250, SpCm 212  Cpr£ 456 Distributed Systems and Middleware  F 3 ComS 311, 362 or 363, Engl 250, SpCm 212  Cpr£ 458/558 Real-Time Systems  F 3 Cpr£ 308 or ComS 352  Cpr£ 458/558 Real-Time Systems  F 3 ComS 311; ComS 352, Engl 250; SpCm 212  ComS 454/554 Distributed & Network Operating Systems  F 3 ComS 311; ComS 352, Engl 250; SpCm 212  ComS 486 Pundamental Concepts & Internals  F 3 ComS 312; ComS 363, Engl 250; SpCm 212  ComS 486 Pundamental Concepts in Computer Networking  S 3 ComS 312; ComS 363, Engl 250; SpCm 212  ComS 4877 Computer Game and Media Programming  S 4 ComS 352  ComS 419X Software Tools for Large Scale Data Analysis  S 4 ComS 352 or Cpr£ 308; ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change  COURSES DESCRIPTION  SEM CR Check latest catalog for complete lists  F/S/SS 3 Econ 101 (Recommended)  The principles of Macroeconomics  F/S/SS 3 Econ 101 (Recommended)  MATH ELECTIVE (3 credits)  The semester courses are offered may change  COURSES DESCRIPTION  SEM CR Check latest catalog for complete lists  FREREQUISITES  COURSES DESCRIPTION  SPEREQUISITES  PREREQUISITES  COURSES DESCRIPTION  SPEREQUISITES  COURSES DESCRIPTION	SE 419x	Software Tools for Large Scale Data Analysis	S	4	ComS 352 or CprE 308; ComS 309		
PREREQUISITES   PREREQUISITE	SE 342	Principles of Programming Languages	F/S	3	·		
COURSES         DESCRIPTION         SEM         CR         Check latest catalog for complete lists           CprE 426         Intro to Parallel Algorithms & Prog.         F         4         ComS 311; CprE 308 or ComS 321           ComS 4300         Advanced Programming Tools         F         3         ComS 311, 362 or 363, Engl 250, SpCm 212           CprE 458/558         Real-Time Systems         F         3         CprE 308 or ComS 352           ComS 454/554         Distributed & Network Operating Systems         All. S         3         CprE 308 or ComS 352           ComS 461         Database System Concepts & Internals         F         3         ComS 311; ComS 363, Engl 250; SpCm 212           ComS 486         Fundamental Concepts in Computer Networking         S         3         ComS 363, Engl 250; SpCm 212           ComS 437X         Computer Game and Media Programming         S         3         ComS 362, or permission of the instructor, co-requisite ComS 336           SE 4 19X         Software Tools for Large Scale Data Analysis         S         4         ComS 352 or CprE 308; ComS 309           ECON ELECTIVE (3 credits)           The semester courses are offered may change         PREREQUISITES           COURSES         DESCRIPTION         SEM         CR         Check latest catalog fo	TECHNICAL EL	ECTIVE (3 credits)					
CprE 426       Intro to Parallel Algorithms & Prog.       F       4       ComS 311; CprE 308 or ComS 321         ComS 430       Advanced Programming Tools       F       3       ComS 311, 362 or 363, Engl 250, SpCm 212         CprE 450       Distributed Systems and Middleware       S       3       CprE 308 or ComS 352         CprE 458/558       Real-Time Systems       F       3       CprE 308 or ComS 352         ComS 454/554       Distributed & Network Operating Systems       Alt. S       3       ComS 311; ComS 352, Engl 250; SpCm 212         ComS 461       Database System Concepts & Internals       F       3       ComS 311; ComS 363, Engl 250; SpCm 212         ComS 486       Fundamental Concepts in Computer Networking       S       3       ComS 352         ComS 437X       Computer Game and Media Programming       S       3       ComS 352 or cpre sols; comS 309         ECON ELECTIVE (3 credits)         The semester courses are offered may change       PREREQUISITES         COURSES       DESCRIPTION       SEM       CR       Check latest catalog for complete lists         Econ 102       Principles of Macroeconomics       F/S/SS       3       Econ 101 (Recommended)         IE 305       Engineering Economic Analysis       F/S/SS       3       Math 166 or 166H	The semester	courses are offered may change			PREREQUISITES		
ComS 430 Advanced Programming Tools F 3 ComS 311, 362 or 363, Engl 250, SpCm 212  CprE 450 Distributed Systems and Middleware S 3 CprE 308 or ComS 352  CprE 458/558 Real-Time Systems F 3 CprE 308 or ComS 352  ComS 454/554 Distributed & Network Operating Systems Alt. S 3 ComS 311; ComS 352, Engl 250; SpCm 212  ComS 461 Database System Concepts & Internals F 3 ComS 311; ComS 363, Engl 250; SpCm 212  ComS 486 Fundamental Concepts in Computer Networking S 3 ComS 311; ComS 363, Engl 250; SpCm 212  ComS 487X Computer Game and Media Programming S 3 ComS 352  ComS 437X Computer Game and Media Programming S 4 ComS 362, or permission of the instructor, co-requisite ComS 336  SE 419X Software Tools for Large Scale Data Analysis S 4 ComS 352 or CprE 308; ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Econ 101 Principles of Microeconomics F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	COURSES	DESCRIPTION	SEM	CR	Check latest catalog for complete lists		
CprE 450 Distributed Systems and Middleware S 3 CprE 308 or ComS 352  CprE 458/558 Real-Time Systems F 3 CprE 308 or ComS 352  ComS 454/554 Distributed & Network Operating Systems Alt. S 3 ComS 311; ComS 352, Engl 250; SpCm 212  ComS 461 Database System Concepts & Internals F 3 ComS 311; ComS 363, Engl 250; SpCm 212  ComS 486 Fundamental Concepts in Computer Networking S 3 ComS 312  ComS 437X Computer Game and Media Programming S 3 ComS 352  ComS 437X Software Tools for Large Scale Data Analysis S 4 ComS 352 or CprE 308; ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Econ 102 Principles of Microeconomics F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  MATH 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	CprE 426	Intro to Parallel Algorithms & Prog.	F	4	ComS 311; CprE 308 or ComS 321		
CprE 458/558 Real-Time Systems F 3 CprE 308 or ComS 352  ComS 454/554 Distributed & Network Operating Systems Alt. S 3 ComS 311; ComS 352, Engl 250; SpCm 212  ComS 461 Database System Concepts & Internals F 3 ComS 311; ComS 363, Engl 250; SpCm 212  ComS 486 Fundamental Concepts in Computer Networking S 3 ComS 352  ComS 437X Computer Game and Media Programming S 3 ComS 362, or permission of the instructor, co-requisite ComS 336  SE 419X Software Tools for Large Scale Data Analysis S 4 ComS 352 or CprE 308; ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Econ 101 Principles of Microeconomics F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	ComS 430	Advanced Programming Tools	F	3	ComS 311, 362 or 363, Engl 250, SpCm 212		
ComS 454/554 Distributed & Network Operating Systems Alt. S 3 ComS 311; ComS 352, Engl 250; SpCm 212  ComS 461 Database System Concepts & Internals F 3 ComS 311; ComS 363, Engl 250; SpCm 212  ComS 486 Fundamental Concepts in Computer Networking S 3 ComS 352  ComS 437X Computer Game and Media Programming S 3 ComS 362, or permission of the instructor, co-requisite ComS 336  SE 419X Software Tools for Large Scale Data Analysis S 4 ComS 352 or CprE 308; ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Econ 101 Principles of Microeconomics F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	CprE 450	Distributed Systems and Middleware	S	3	CprE 308 or ComS 352		
ComS 461 Database System Concepts & Internals F 3 ComS 311; ComS 363, Engl 250; SpCm 212  ComS 486 Fundamental Concepts in Computer Networking S 3 ComS 352  ComS 437X Computer Game and Media Programming S 3 ComS 362, or permission of the instructor, co-requisite ComS 336  SE 419X Software Tools for Large Scale Data Analysis S 4 ComS 352 or CprE 308; ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Econ 101 Principles of Microeconomics F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	CprE 458/558	Real-Time Systems	F	3	CprE 308 or ComS 352		
ComS 486 Fundamental Concepts in Computer Networking S 3 ComS 352  ComS 437X Computer Game and Media Programming S 3 ComS 362, or permission of the instructor, co-requisite ComS 336  SE 419X Software Tools for Large Scale Data Analysis S 4 ComS 352 or CprE 308; ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Econ 101 Principles of Microeconomics F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics F/S/SS 3 2 semesters of calculus	ComS 454/554	Distributed & Network Operating Systems	Alt. S	3	ComS 311; ComS 352, Engl 250; SpCm 212		
ComS 437X Computer Game and Media Programming  S 3 ComS 362, or permission of the instructor, co-requisite ComS 336  SE 419X Software Tools for Large Scale Data Analysis  S 4 ComS 352 or CprE 308; ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change  PREREQUISITES  COURSES  DESCRIPTION  SEM CR Check latest catalog for complete lists  Econ 101 Principles of Microeconomics  F/S/SS 3  Econ 102 Principles of Macroeconomics  F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis  F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change  COURSES  DESCRIPTION  SEM CR Check latest catalog for complete lists  The semester courses are offered may change  FREREQUISITES  COURSES  DESCRIPTION  SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics  F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra  F/S/SS 3 2 semesters of calculus	ComS 461	Database System Concepts & Internals	F	3	ComS 311; ComS 363, Engl 250; SpCm 212		
SE 419X Software Tools for Large Scale Data Analysis S 4 ComS 352 or CprE 308; ComS 309  ECON ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Econ 101 Principles of Microeconomics F/S/SS 3  Econ 102 Principles of Macroeconomics F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	ComS 486	Fundamental Concepts in Computer Networking	S	3	ComS 352		
ECON ELECTIVE (3 credits)  The semester courses are offered may change  COURSES  DESCRIPTION  SEM CR Check latest catalog for complete lists  Econ 101 Principles of Microeconomics  F/S/SS 3  Econ 102 Principles of Macroeconomics  F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis  F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change  COURSES  DESCRIPTION  SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics  F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra  F/S/SS 3 2 semesters of calculus	ComS 437X	Computer Game and Media Programming	S	3			
The semester courses are offered may change  COURSES DESCRIPTION  SEM CR Check latest catalog for complete lists  Econ 101 Principles of Microeconomics F/S/SS 3  Econ 102 Principles of Macroeconomics F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	SE 419X	Software Tools for Large Scale Data Analysis	S	4	ComS 352 or CprE 308; ComS 309		
COURSES       DESCRIPTION       SEM       CR       Check latest catalog for complete lists         Econ 101       Principles of Microeconomics       F/S/SS       3         Econ 102       Principles of Macroeconomics       F/S/SS       3       Econ 101 (Recommended)         IE 305       Engineering Economic Analysis       F/S/SS       3       Math 166 or 166H         MATH ELECTIVE (3 credits)       The semester courses are offered may change         COURSES       DESCRIPTION       SEM       CR       Check latest catalog for complete lists         Math 304       Introductory Combinatorics       F       3       Math 166 or 166H; 201 or experience with proofs         Math 307       Matrices and Linear Algebra       F/S/SS       3       2 semesters of calculus	ECON ELECTIV	E (3 credits)					
Econ 101 Principles of Microeconomics F/S/SS 3  Econ 102 Principles of Macroeconomics F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	The semester	courses are offered may change			PREREQUISITES		
Econ 102 Principles of Macroeconomics F/S/SS 3 Econ 101 (Recommended)  IE 305 Engineering Economic Analysis F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	COURSES	DESCRIPTION	SEM	CR	Check latest catalog for complete lists		
IE 305 Engineering Economic Analysis F/S/SS 3 Math 166 or 166H  MATH ELECTIVE (3 credits)  The semester courses are offered may change PREREQUISITES  COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	Econ 101	Principles of Microeconomics	F/S/SS	3			
MATH ELECTIVE (3 credits)  The semester courses are offered may change  COURSES  DESCRIPTION  SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics  F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra  F/S/SS 3 2 semesters of calculus	Econ 102	Principles of Macroeconomics	F/S/SS	3	Econ 101 (Recommended)		
The semester courses are offered may changePREREQUISITESCOURSESDESCRIPTIONSEMCRCheck latest catalog for complete listsMath 304Introductory CombinatoricsF3Math 166 or 166H; 201 or experience with proofsMath 307Matrices and Linear AlgebraF/S/SS32 semesters of calculus	IE 305	Engineering Economic Analysis	F/S/SS	3	Math 166 or 166H		
COURSES DESCRIPTION SEM CR Check latest catalog for complete lists  Math 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	MATH ELECTIVE (3 credits)						
Math 304 Introductory Combinatorics F 3 Math 166 or 166H; 201 or experience with proofs  Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	The semester	courses are offered may change	PREREQUISITES				
Math 307 Matrices and Linear Algebra F/S/SS 3 2 semesters of calculus	COURSES	DESCRIPTION	SEM	CR	Check latest catalog for complete lists		
	Math 304	Introductory Combinatorics	F	3	Math 166 or 166H; 201 or experience with proofs		
Math 314 Graphs and Networks S 3 Math 166 or 166H; 201 or experience with proofs	Math 307	Matrices and Linear Algebra	F/S/SS	3	2 semesters of calculus		
	Math 314	Graphs and Networks	S	3	Math 166 or 166H; 201 or experience with proofs		

4 Math 166 Cr/E 201

F/S

# **Supplementary Electives (9 credits)**

Nine (9) semester credit hours of Supplementary Electives are required for Software Engineering. Courses not on the Supplementary Elective list may be counted as Supplementary Electives only if approved by the SE Program Petition Committee. A written request must be submitted and approved **before** the course is taken. For 500-level Supplementary Elective courses, see your academic advisor. 500-level courses are open to "qualified undergraduate students" (students in the upper half of their class).

### **SUPPLEMENTARY ELECTIVES (9 credits)**

- 9 credits of Supplementary Elective courses are required for the Software Engineering program.
- Students who have taken 4 credit lab courses CPRE 288, CPRE 308 and CPRE 381 are required to take 6 credits of Supplementary Elective courses. Excess credits from CprE 288, CprE 381, and/or CprE 308 may be applied to meet Supplementary Elective credit requirement.

# The semester courses are offered may change PREREQUISITES COURSES DESCRIPTION SEM CR Check latest catal

COURSES	DESCRIPTION	SEM	CR	Check latest catalog for complete lists
SE 409	Software Requirements Engineering	F	3	ComS 309
SE 412	Format Aspects of Specification and Verification	S	3	SE 319, ComS 309
SE 416	Software Evolution and Maintenance	F	3	ComS 309
SE 417	Software Testing	S	3	ComS 309
SE 419x	Software Tools for Large Scale Data Analysis	S	4	ComS 352 or CprE 308; ComS 309
* ComS 229	Advanced Programming Techniques	F/S	3	ComS 228 (with C- or better); Cr/E Math 166
ComS 331	Theory of Computing	F/S	3	ComS 228 (C- or better); C- or better in ComS 330 or CprE 310; Math 166(C- or better) & Engl 250
ComS 342	Principles of Programming Languages	F/S	3	ComS 321; ComS 330 or CprE 310; either ComS 309, 362 or 363; Engl 250
ComS 336X	Introduction to Computer Graphics	F/S	3	ComS 229, CoReq Math 307 or Math 317 or Math 265
ComS 362	Object Oriented Analysis & Design	F/S	3	ComS 228 (with C- or better); Engl 250
ComS 425	High Perform Computing for S & E	S	3	ComS 311; 330; Engl 250; SpCm 212
ComS/CprE 426	Intro to Parallel Algorithms & Prog.	F	4	ComS 311; CprE 308 or ComS 321
ComS 430	Advanced Programming Tools	S	3	ComS 311; ComS 362 or 363, Engl 250; SpCm 212
* CprE 288	Embedded Systems I: Introduction	F/S	4	CprE 281; ComS 207 or ComS 227
CprE 388	Embedded Systems II: Mobile Platforms	F	4	CprE 288/288X
CprE 431	Basics of Information Systems Security	S	3	Cr/E CprE 489 or ComS 454
ComS 433	Computational Models of Nanoscale Self-Assembly	S	3	C- or higher in ComS 331 or consent of the instructor
Com S 437X	Computer Game and Media Programming	S	3	Com S 362, or permission of the instructor, co-requisite Com S 336
ComS 440	Principles & Practices of Compiling	S	3	ComS 331; ComS 342; Engl 250; SpCm 212
CprE 450	Distributed Systems & Middleware	S	3	CprE 308 or ComS 352
ComS/CprE 454	Distributed & Network Operating Systems	Alt S	3	ComS 311; ComS 352, Engl 250; SpCm 212

<sup>\*</sup> This course can be counted as part of required curriculum or as a supplementary elective but not for both

## The semester courses are offered may change

## **PREREQUISITES**

COURSES	DESCRIPTION	SEM	CR	Check latest catalog for complete lists
ComS 455	Simulation: Algorithms & Implementation	F	3	ComS 311; ComS 330; Stat 330; Engl 150; SpCm 212
ComS 461	Database System Concepts & Internals	F	3	ComS 311; ComS 363, Engl 250; SpCm 212
ComS 472	Principles of Artificial Intelligence	F	3	CprE 310 or ComS 330; ComS 342, ComS 311, Stat 330; Engl 250; SpCm 212
ComS 477	Prob. Solving Tech. for Applied ComS	F	3	ComS 228 (with C- or better); CprE 310 or ComS 330; Math 166; Math 307 or 317 or consent of instructor
ComS 481	Numerical Soln. of Diff. Eqns. & Interpltn.	S/SS	3	Math 265; either Math 266 or 267; knowledge of a programming language
CprE 483	Hardware Software Integration	S	4	CprE 381
ComS 486	Fundamental Concepts in Computer Networking	S	3	ComS 352
CprE 488	Embedded Systems Design	F	4	CprE 381, ComS 321
CprE 489	Computer Networking & Data Comm	F/S	4	CprE 381 or EE 324
CprE/ComS 490	Independent Study	F/S/SS	1	Only 2 credits of 490 may be used as tech elective - Senior Classification
CprE 418	Meas. & Test. for High Speed Sys. Engr.	F	3	EE 230, CprE 311
CE/EE 388	Sustainable Engineering and International Development	F	3	Junior classification in Engr
ME 484	Technology, Globalization, and Culture	S	3	Senior classification
CprE 530	Advanced Protocols & Network Security	F	3	CprE 381 or Com S 321