

## UNIVERSITY OF SOUTH FLORIDA College of Engineering

# Undergraduate Programs





The information here is provided as a guide. The <u>USF Undergraduate Catalogue</u> is the only definitive source of program requirements.

## Admission Requirements for First Time in College Students for All Engineering Majors and for the Computer Science Major

(Excludes Admission Requirements for the Information Technology Major - see below)

First time in college students and lower division students with 30 credits or less, who meet the criteria below, are granted direct entry into the College of Engineering:

- 1. Admitted fully to the University of South Florida as a degree seeking student;
- 2. Test Scores:
  - SATM-a minimum quantitative score of 550 or
  - ACTM-a minimum score of 24 or
  - Completed College Algebra with a grade of C or better (not C-) or
  - Take College Algebra at USF before the first fall semester and get a grade of C or better (not C-).

Those students who do not meet the above criteria can be admitted to the college after satisfactorily completing Calculus I and II and Physics I with lab, all with a minimum grade of C or better (not C-) in no more than two (2) attempts per course while at USF. Two attempts includes withdrawal from a course.

Additional requirements must be met prior to admission to specific degree programs.

## Admission Requirements for First Time in College Students applying to the Information Technology Major

Admitted to the University of South Florida as a degree-seeking student. Please note: These admission requirements do not apply to any other College of Engineering undergraduate major.

## Admission Requirements for Transfer Students for All Engineering Majors and for the Computer Science Major

(Excludes Admission Requirements for the Information Technology Major - see below)

- 1. Admitted fully to the University of South Florida as a degree-seeking student with more than 30 earned credits.
- 2. Transfer students must complete all of the following courses with a grade of C or better (not C-) in each course (maximum two {2} attempts allowed to earn required grade and a withdrawal is considered an attempt:

Calculus I (MAC X281 or MAC X311 or equivalent) Calculus II (MAC X282 or MAC X312 or equivalent), and Calculus-based Physics I with lab (PHY X048 or PHY X045 and PHY X048L or PHY X045L or equivalent)

If a student does not meet these admissions requirements, the student can attempt to meet these transfer admission requirements in no more than two (2) attempts per course while at USF. If a grade of C is not attained in each of these courses in two or less attempts, the student will be redirected to another major.

For the specific state mandated common prerequisite courses for each major within the College of Engineering, please see the section titled, "State Mandated Common Prerequisites" located in each department's

section of the catalog.

3. Florida College System transfer students who have met the minimum criteria above and have completed the prerequisites required for their major with the minimum grades and GPA required by the academic department are accepted directly into the College of Engineering and into the specific program/major.

## Transfer Admission Requirements for the Information Technology Major

For the specific state mandated common prerequisite courses for the Information Technology major, please see the section titled, "State Mandated Common Course Prerequisites" located in the Information Technology major.



## **Real World Opportunities**

**Co-ops and Internships** - These programs offer students numerous opportunities to engage with the broader engineering, technology and science community and gain valuable on the job experience.

**Engineering EXPO** – This engineering student-run event exposes school children to science and engineering principles in a two-day, on campus event.

**Research Experiences for Undergraduates** - The program gives undergraduate students an opportunity to participate in research projects. Students work as research assistants with professors and graduate students on a variety of exciting and interdisciplinary research projects.

**BEST@USF** - The Bulls Engineering Success Training (BEST) program provides selected undergraduate students in the College of Engineering an interdisciplinary industry-based capstone design experience.

The bachelor of science degree programs in Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Industrial Engineering, and Mechanical Engineering are accredited by the Engineering Accreditation Commission of ABET.

The bachelor of science degree program in Computer Science is accredited by the Computing Accreditation Commission of ABET. <u>www.abet.org</u>



- Tau Beta Pi
- Chi Epsilon
- Eta Kappa Nu
- Omega Chi Epsilon
- Theta Tau
- Upsilon Pi Epsilon
- American Institute of Chemical Engineers
- American Society of Civil Engineers
- Biomedical Engineering Society

- Engineers Without Borders
- Florida Engineering Society
- IEEE Computer Society
- IEEE Electrical Engineering Society
- Institute of Industrial Engineers
- Institute of Transportation Engineers
- National Society of Black Engineers
- Society of Hispanic Professional Engineers
- Society of Women Engineers

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Fall Semester - Year 1			Spring Semester - Year 1		
CHM 2045 General Chemistry I		3	CHM 2046 General Chemistry II		3
CHM 2045L General Chemistry I Laboratory		1	CHM 2046L General Chemistry II Laboratory		1
EGN 3000 Foundations of Engineering		R	ENC 1102 Composition II		3
EGN 3000L Foundations of Engineering		1	MAC 2282 Engineering Calculus II		4
ENC 1101 Composition I		3	PHY 2048 General Physics I		3
MAC 2281 Engineering Calculus I		4	PHY 2048L General Physics I Laboratory		1
FKL/ Humanities Elective		3	_	_	
	Total	15		Total	15
Fall Semester - Year 2			Spring Semester - Year 2		
EGN 3443 Engineering Statistics I		3	BME 3053 Computer Programming for BME		3
MAC 2283 Engineering Calculus III		4	EGN 3343 Thermodynamics I		3
PHY 2049 General Physics II		3	EGN 3433 Mod Analysis for Engineering		3
PHY 2049L General Physics II Laboratory		1	BSC 2010 Bio I - Cellular Processes		3
BME 4100 Introduction to Biomedical Engineering		3	BSC 2010L Bio I - Cellular Processes lab		1
EGN 3311 Statics		3	FKL/Social & Behavioral Elective	_	3
	Total	17		Total	16
Summer Term - Year 2					
CHM 2210 Organic Chemistry I		3			
CHM 2210L Organic Chemistry Laboratory I		2			
ENC 3246 Communications for Engineers		3	_		
	Total	8			
Fall Semester - Year 3			Spring Semester - Year 3		
Professional Development Elective		1	3000 & up Professional Elective		5
BSC 2011 Bio II - Biological Diversity		3	BME 4409 Engineering Physiology		3
BSC 2011L Bio II - Biological Diversity Lab		1	BME 4056C Biomedical Engineering Lab I		2
BME 4508 Biomedical Signal Systems Analysis		3	BME 3032 Biomedical Transport Processes		3
EGN 3373 Intro to Electrical Systems I		3	St. Gen Ed: Social & Behavioral Elective	_	3
BME 4503 Biomedical Instrumentation		3		Total	16
FKL/Fine Arts Elective		3	_		
	Total	17			
Fall Semester - Year 4			Spring Semester - Year 4		
Professional Development Elective		1	BME 4883 Biomedical Engineering Design II		3
BME 3312 Molecular & Cellular Eng.		3	BME Upper level Elective		3
BME 4057C Biomedical Engineering Lab II		2	COE Upper level Elective		3
BME 4882 Biomedical Engineering Design I		3	FKL Human Cultural Diversity & Global Electiv	e _	3
BME Upper level Elective		3		Total	12
St. Gen Ed: Humanities Elective		3	_		
	Total	15			

#### 2017 median starting salary: \$58,604

(NACE Spring 2017 Salary Survey)

General program information

Note: Minimum grade for math and science courses is a C, prerequisite major courses is a C-

Upper Elective classes have to be 3000 level or above and approved by the advisor.

Professional Elective: Engineering students must complete at least 5 credits outside of COE that are 3000 level or above and approved by the advisor.

Professional Elective: Pre-Med students must use this to take CHM 2211 Organic Chemistry II.

	First Year			
Fall	Semester	Spr	ing Semester	
3	ENC 1101 Composition I	3	ENC 1102 Composition II	
4	MAC 2281 or MAC 2311 Calculus I	4	MAC 2282 or MAC 2312 Calculus II	
3	CHM 2045 General Chemistry I	3	CHM 2046 General Chemistry II	
1	CHM 2045L General Chemistry I Lab	1	CHM 2046L General Chemistry II La	ab
R	EGN 3000 Foundations of Engineering	3	PHY 2048 General Physics I	
1	EGN 3000 LAB Foundations of Engineering	1	PHY 2048L General Physics I Lab	
<u>3</u>	FKL Human/Diversity & Global Elective	<u>1</u>	PHZ 2102 <sup>†</sup> Problems Physics I	
15	Total Credits	15	(16) Total Credits	
	Second Year			
Fall	Semester	Spri	ing Semester	Summer School
4	MAC 2283 or MAC 2313 Calculus III	3	EGN 3433 Modeling & Analysis of	3 CHM 2210 Org Chem
3	PHY 2049 General Physics II		Engineering Systems	2 CHM 2210L OrgCh Lab
1	PHY 2049L General Physics II Lab		or MAP 2302 Differential Equations	1 ChBME Dept Upper
3	ECH 3854 ChBME Computations	3	EGN 3343 Thermodynamics	Level Elective
3	ECH 3002 Intro to ChBME	3	ECH 3023 Mat'l & Energy Balances	3 ENC3246 Comm.
<u>3</u>	St. GenEd Humanities Elective	3	FKL Social & Behavioral Science	for Engineers (WI)
		<u>3</u>	FKL Humanities (with HHCP)	
15	Total Credits	15	Total Credits	9 Total Credits
	Third Year			
Fall	Semester	Spr	ing Semester	Internship/Co-op
3	ECH 3266 Transport Phenomena I	3	BME 4406 Engineering of Biol Syst.	List Company/employer
3	ECH 4123 ChE Thermodynamics	3	ECH 4267 Transport Phenomena II	name and position
3	ECH 4846 Numerical Methods	3	ECH 4418 Separations	
3	EMA 4003 Intro to Materials Science	3	ECH 3702 Instrument Systems	
<u>3</u>	Department Upper Level Elective	<u>3</u>	Department Upper Level Elective	
15	Total Credits	15	Total Credits	
	Fourth Year			
Fall	Semester	Sp	oring Semester	
3	ECH 3240L Chemical Engineering Lab I	3	ECH 4241L Chemical Engineering La	ıb II
3	ECH 4504 Kin & Reaction Engineering	3	ECH 4323 Process Dynamics and Co	ontrol
3	ECH 4605 Product & Process Systems	3	ECH 4615 Product and Process Design	gn (CD)
3	Department Upper Level Elective	3	Department Upper Level Elective	
<u>3</u>	FKL Fine Arts Elective	<u>3</u>	St. GenEd Social Science Elective	
15	Total Credits	15	Total Credits	
	2017 median starting sa	alary: \$	67,998 Note: Courses in	bold must be completed with an

(NACE Spring 2017 Salary Survey)

General program information

Note: Courses in bold must be completed with an overall grade point average of 2.75 † – Optional, but highly encouraged. R – Required course. Chemistry will be applied as FKL Life Science

	First Year				
Fall	Semester	Sp	ring Semester		
3	ENC 1101 Composition I	3	ENC 1102 Composition II		
4	MAC 2281 or MAC 2311 Calculus I	4	MAC 2282 or MAC 2312 Calculus II		
3	CHS 2440 or CHM 2045 Chemistry I	3	FKL Fine Arts Elective		
1	CHS 2440L or CHM 2045L Chemistry I Lab	3	PHY 2048 General Physics I		
R	EGN 3000 Foundations of Engineering	1	PHY 2048L General Physics I Lab		
1	EGN 3000L Foundations of Engineering Lab	(1)	PHZ 2102 <sup>†</sup> Problems Physics I		
<u>3</u>	St. GenEd Social Science Elective	<u>3</u>	EGN 1113 Introduction to Design Graph	ics	
15	Total Credits	17	(18) Total Credits		
	Second Year				
Fall	Semester	Spr	ing Semester	S	ummer School
4	MAC 2283 or MAC 2313 Calculus III	3	MAP 2302 Differential Eq. or EGN 3433	3	EGN 3615 Engr Econ
3	PHY 2049 General Physics II		Modeling & Analysis of Engr Systems		(FKL Soc/Behav)
1	PHY 2049L General Physics II Lab	3	EGN 3321 Dynamics	3	FKL Human/Diversity &
3	* EGN 3311 Statics	3	EGN 3353 Basic Fluid Mechanics		Global Elective
3	EGN 4453 Numerical & Computer Tools I	3	EGN 3331 Mechanics of Materials	<u>3</u>	ENC 3246 Comm. for
<u>3</u>	EGN 3365 Materials I	1	EGN 3331L Mechanics of Materials Lab		Engrs (6A WI)
		<u>3</u>	St. GenEd Humanities Elective		
17	Total Credits	16	Total Credits	9	Total Credits
	Third Year				
Fall	Semester	Spri	ng Semester		Internship/Co-op
3	ENV 4001 Environmental Systems Engineering	3	CES 3102 Structures I		List Company/employer
3	TTE 4004 Transportation Engineering I	3	CWR 4202 Hydraulics		name and position
3	EGN 3343 Thermodynamics	1	ENV 4004L Environmental/Hydraulics La	b	
3	EGN 3443 Probability & Statistics for Engineers	3	GLY 3850 Geology for Engineers		
<u>3</u>	EGN4454 Numerical & Computer Tools II	3	CE Track Elective		
		<u>3</u>	FKL Humanities Elective (with HHCP)		
15	Total Credits	16	Total Credits		
	Fourth Year				
Fal	Semester	Sp	ring Semester		
3	CEG 4011 Geotechnical Engineering I	3	CE Track Elective		
1	CEG 4011L Geotechnical/Transportation Lab	3	CE Track Elective		
3	CE Track Elective	3	CE Capstone Design Requirement (CD)		
3	CE Track Elective	1	CGN 4122 Professional/Ethical Issues in	En	gr
<u>3</u>	EGN 3373 Intro to Electrical Systems I	<u>3</u>	CE Track Elective		
13	Total Credits	13	Total Credits		

### 2017 median starting salary: \$57,500

(NACE Spring 2017 Salary Survey)

General program information

Note: Courses in bold must be completed with an overall grade point average of 3.0 \* - High Priority course that begins a five semester sequence † - Optional, but highly encouraged R – Required course Chemistry will be applied as FKL Life Science

## **Computer Engineering**

Bachelor of Science in Computer Engineering (BSCP)

	First Year				
Fall	Semester	Sp	ring Semester		
3	ENC 1101 Composition I	3	ENC 1102 Composition II		
4	MAC 2281 or MAC 2311 Calculus I	4	MAC 2282 or MAC 2312 Calculus II		
3	CHS 2440 or CHM 2045 Chemistry I	3	PHY 2048 General Physics I		
1	CHS 2440L or CHM 2045L Chemistry I Lab	1	PHY 2048L General Physics I Lab		
R	EGN 3000 Foundations of Engineering	(1)	PHZ 2102 <sup>†</sup> Problems Physics I		
1	EGN 3000L Foundations of Engineering Lab	3	*COP 2510 Programming Concepts		
3	St. GenEd Social Science Elective				
15	Total Credits	14	(15) Total Credits		
	Second Year				
Fall	Semester	Spi	ring Semester	;	Summer School
4	MAC 2283 or MAC 2313 Calculus III	3	MAP 2302 Differential Eq. or EGN 343	3	3 CDA 3201 Logic Design
3	PHY 2049 General Physics II		Modeling & Analysis of Engr System	าร	1 CDA 3201L Logic Lab
1	PHY 2049L General Physics II Lab	3	*CDA 3103 Computer Organization		3 COP 4530 Data Structures
3	*COP 3514 Program Design	3	COT 3100 Intro Discrete Structures		EGN 4450 Introduction to
<u>3</u>	FKL Social & Behavioral Science Elective	3	COP 3331 Object Oriented Design		Linear Systems
		3	St. GenEd Humanities Elective		
14	Total Credits	15	Total Credits		9 Total Credits
	Third Year				
Fall	Semester	Spri	ing Semester		Internship/Co-op
3	CDA 4205 Computer Architecture	3	CDA 4203 Computer System Design		List Company/employer
3	EEE 3394 Electronic Materials	1	CDA 4203L Computer Syst Design La	b	name and position
3	EGN 3373 Electrical Systems I	3	EGN 3615 Engineering Economics		
3	COT 4400 Analysis of Algorithms	3	COP 4600 Operating Systems		
<u>3</u>	CSE Hardware Elective	3	CSE Hardware Elective		
		<u>3</u>	Natural Science Elective (Life or Physi	cal)	
15	Total Credits	16	Total Credits		
	Fourth Year				
Fall	Semester	S	pring Semester		
3	CDA 4213 CMOS-VLSI Design	2	CIS 4910 Senior Project		
1	CDA 4213L CMOS-VLSI Design Lab	3	CIS 4250 Ethical Issues & Profession	nal C	Conduct (CD)
3	EGN 3443 Probability and Statistics for Engineers	3	FKL Human/Diversity & Global Elective	ve	
3	ENC 3246 Communication for Engineers (6A WI)	3	FKL Humanities Elective (with HHCP)	)	
3	FKL Fine Arts Elective	<u>3</u>	CSE Elective		
<u>3</u>	CSE Elective				
16	Total Credits	14	Total Credits		
	2017 modion starting	alan	• \$74 008 N	otes	Courses in hold must be com-
	(NACE Spring 2017 S	urvey) †	eted - Op - Re - Re	with a competitive GPA tional, but highly encouraged quires a minimum grade of a "B" equired course	

General program information

Chemistry will be applied as the FKL Life Science.

## Mini-Circuits®



## Introducing the Mini-Circuits Design for X Laboratory

The <u>Mini Circuits Design for X Laboratory</u> (DFX) is a collaborative 'makerspace' for undergraduate students at the University of South Florida to pursue engineering projects that expand their creative design and project management skills. The main objective of DFX is to encourage students to engage in hands-on engineering projects and to enable the teaching of project-based engineering courses. DFX features a number of digital manufacturing tools and work/ electronics benches that are available to all students who pursue engineering projects. Collaborations with non-engineering students are encouraged. Faculty are encouraged to participate in a collaborative or advising role with students pursuing projects.

The Design for X lab is home to new equipment that students can access to complete important engineering projects. Lab equipment includes a list of the following:

- PCB, CNC Mills
- Laser Cutter
- Makerbot Replicators Z18, 2X
- Makerbot 3D Scanner
- Vinyl Cutter
- Stratasys U-Print
- Electronics Workbench
- Function Generators
- Network Analyzers
- Oscilliscopes





	First Year				
Fall	Semester	Sp	ring Semester		
3	ENC 1101 Composition I	3	ENC 1102 Composition II		
4	MAC 2281 or MAC 2311 Calculus I	4	MAC 2282 or MAC 2312 Calculus	11	
R	EGN 3000 Foundations of Engineering	3	PHY 2048 General Physics I		
1	EGN 3000L Foundations of Engineering LAB	1	PHY 2048L General Physics I Lab	5	
3	Natural Science Elective (Life or Physical)	(1)	PHZ 2102 <sup>†</sup> Problems Physics I		
<u>3</u>	St. GenEd Social Science Elective	3	*COP 2510 Programming Concepts	5	
14	Total Credits	14	(15) Total Credits		
	Second Year				
Fall	Semester	Spr	ring Semester	S	ummer School
4	MAC 2283 or MAC 2313 Calculus III	3	*CDA 3103 Computer Organization	3	COP 4530 Data Structures
3	PHY 2049 General Physics II	3	COT 3100 Intro Discrete Structures	3	CDA 3201 Logic Design
1	PHY 2049L General Physics II Lab	3	COP 3331 Object Oriented Design	1	CDA 3201L Logic Lab
3	*COP 3514 Program Design	<u>3</u>	St. GenEd Humanities Elective	2	EGN 4450 Linear Systems
<u>3</u>	FKL Social & Behavioral Science Elective				
14	Total Credits	12	Total Credits	9	Total Credits
	Third Year				
Fall	Semester	Sp	oring Semester		Internship/Co-op
3	CDA 4205 Computer Architecture	3	COP 4600 Operating Systems		List Company/employer
3	COT 4400 Analysis of Algorithms	3	CSE Theory Elective		name and position
3	EGN 3443 Probability and Statistics for Engineers	3	CSE Software Elective		
3	CSE Software Elective	3	CSE Elective		
<u>3</u>	Natural Science Elective (Life or Physical)	<u>3</u>	ENC 3246 Comm. for Engrs (WI)		
15	Total Credits	15	Total Credits		
	Fourth Year				
Fal	Semester	S	pring Semester		
3	FKL Fine Arts Elective	3	CIS 4250 Ethical Issues & Professio	nal (	Conduct (WI,CD)
3	FKL Human/Diversity & Global Elective	3	CSE Elective		
3	FKL Humanities Elective (with HHCP)	3	CSE Elective		
3	CSE Elective	<u>3</u>	CEN 4020 Software Engineering		
<u>3</u>	CSE Elective				
15	Total Credits	12	Total Credits		
	2017 median starting salar	-y: \$7	4,500	Note	s: Courses in bold must be com

(NACE Spring 2017 Salary Survey)

General program information

Notes: Courses in bold must be completed with a competitive GPA † - Optional, but highly encouraged. \* - Requires a minimum grade of a "B". R - Required course. Natural Science Elective will meet the

## **Electrical Engineering**

	First Year				
Fall	Semester	Sp	oring Semester		
3	ENC 1101 Composition I	3	ENC 1102 Composition II		
4	MAC 2281 or MAC 2311 Calculus I	4	MAC 2282 or MAC 2312 Calculus II		
3	CHS 2440 or CHM 2045 Chemistry I	3	PHY 2048 General Physics I		
1	CHS 2440L or CHM 2045L Chemistry I Lab	1	PHY 2048L General Physics I Lab		
R	EGN 3000 Foundations of Engineering	(1)	) PHZ 2102 <sup>†</sup> Problems Physics I		
1	EGN 3000 LAB Foundations of Engineering	<u>3</u>	EEL 3705 Fund. Of Digital Circuits		
<u>3</u>	FKL Humanities Elective (with HHCP)				
15	Total Credits	14	(15) Total Credits		
	Second Year				
Fall	Semester	Spr	ing Semester	Sı	ummer School
4	MAC 2283 or MAC 2313 Calculus III	3 *	EGN 3433 Modeling & Analysis	3	EGN 3374 Electrical Sys II
3	EGN 3420 Engineering Analysis		or MAP 2302 Differential Eq.	3	ENC 3246 Communications
3	EEE 3394 EE Science I - Electronic Materials	3 E	EGN 3373 Electrical Systems I	3	EGN 3615 Eng Economics
1	EEL 3705L Logic Lab	4 *	*EEL 3472C EE Science II – Electromag. or PHY 2049/L Physics II with Lab		(FKL Social Behavioral
3	EKI Fine Arts Elective	3 F	FEI 2161 Electrical Engr Comp Methods		Science)
<u> </u>		3 5	St. GenEd Humanities Elective (with 6A)		
15	Total Credits	<u>-</u> 16	Total Credits	9	Total Credits
	Third Year				
Fall	Semester	Sp	oring Semester		Internship/Co-op
3	EEL 4102 Signals & Systems	3	EEL xxxx EE Core Technical Elective		List Company/employer
3	EGN 3443 Probability & Statistics for Engineers	3	EEL xxxx EE Core Technical Elective		name and position
1	EEL 3115L Lab I (Circuits)	3	EEL xxxx EE Upper Level Technical Electi	ve	•
1	EEL 3163C Computer Tools Lab	3	EEL xxxx EE Upper Level Technical Electi	ve	
3	EEL xxxx EE Core Technical Elective	3	EEL or EGN Upper Level Technical Electiv	/e	
<u>3</u>	EEL xxxx EE Core Technical Elective	<u>1</u>	EEL xxxx EE Lab Elective		
14	Total Credits	16	Total Credits		
	Fourth Year				
Fall	Semester	Sp	oring Semester		
3	EEL xxxx EE Upper Level Technical Elective	3	EEL 4914 EE Design II (CD)		
3	EEL xxxx EE Upper Level Technical Elective	3	EEL xxxx EE Upper Level Technical Electi	ve	

- 3 EEL xxxx EE Upper Level Technical Elective
- 1 EEL xxxx EE Lab Elective
- 1 EEL xxxx EE Lab Elective
- 3 FKL Human/Diversity & Global Elective
- 14 Total Credits

### 2017 median starting salary: \$67,607 (NACE Spring 2017 Salary Survey)

St. GenEd Social Science Elective

EEL xxxx EE Upper Level Technical Elective

EEL xxxx EE Upper Level Technical Elective

EEL 4906 EE Design I

Total Credits

3 3

3

<u>3</u>

14

#### General program information

Notes: Courses in bold must be completed with an overall grade point average of 2.75\* \* - Requires a minimum grade of a "B". † - Optional, but highly encouraged. R - Required course.

Chemistry will be applied as FKL Life Science.

## Industrial Engineering

#### **First Year**

	Thist real		
Fall	Semester	Spring	Semester
3	ENC 1101 Composition I	3	ENC 1102 Composition II
4	MAC 2281 or MAC 2311 Calculus I	4	MAC 2282 or MAC 2312 Calculus II
3	CHS 2440 or CHM 2045 Chemistry I	3	PHY 2048 General Physics I
1	CHS 2440L or CHM 2045L Chemistry I Lab	1	PHY 2048L General Physics I Lab
R	EGN 3000 Foundations of Engineering	(1)	PHZ 2102 <sup>†</sup> Problems Physics I
1	EGN 3000 LAB Foundations of Engineering	3	St. GenEd Humanities Elective
<u>3</u>	St. GenEd Social Science Elective	<u>3</u>	FKL Fine Arts Elective
15	Total Credits	17 (18)	Total Credits

## Second Year

Fall	Fall Semester		ring Semester	Summer School		
4	MAC 2283 or MAC 2313 Calculus III	3	EGN 3311 Statics	3	EGN 3343 Thermo	
3	PHY 2049 General Physics II	3	EGN 3365 Materials Engineering I	3	EGN 3615 Engr Econ	
1	PHY 2049L General Physics II Lab	3	EGN 3373 Intro to Electrical Systems I		(FKL Soc/Behav Elect)	
2	EGN 4450 Linear Systems	3	EGN 3433 Modeling & Analysis of Syst	<u>3</u>	EGN 1113 Design	
3	EGN 3443 Probability & Statistics for Engr		or MAP 2302 Differential Equations		Graphics	
<u>3</u>	FKL Humanities Elective (with HHCP)	<u>3</u>	FKL Human/Diversity & Global Elective			
16	Total Credits	15	Total Credits	9	Total Credits	

### Spring Somostor

Fall Semester			ring Semester	Internship/Co-op
3	ESI 4007 <sup>F</sup> Engineering Programming	3	ESI 4620 <sup>S</sup> Design of Industrial Info Systems	List Company/employer
3	EIN 4312C <sup>F</sup> Work Analysis	3	EIN 4333 <sup>S</sup> Production Control	name and position
3	EIN 4621 <sup>F</sup> Manufacturing Processes	3	ESI 4221 <sup>S</sup> Industrial Statistics/Quality Control	
3	ESI 4312 <sup>F</sup> Deterministic Operations Research	3	ESI 4313 <sup>S</sup> Probabilistic OR	
<u>3</u>	ENC 3246 Communication for Engrs (6A WI)	<u>3</u>	Tech Elective Industrial Engineering	
15	Total Credits	15	Total Credits	

#### Fourth Year

Third Year

Fall	Semester	Sp	oring Semester	
3	EIN 4364 <sup>F</sup> Facilities Design & Cost Analysis	3	EIN 4243C <sup>S</sup> Human Factors (6A)	
3	ESI 4606 <sup>F</sup> Engineering Analytics I	3	EIN 4891 <sup>S</sup> Capstone Design (CD)	
3	ESI 4244 <sup>F</sup> Design of Experiments	3	EIN 4601C <sup>S</sup> Automation and Robotics	
3	ESI 4523 <sup>F</sup> Industrial Systems Simulation	<u>3</u>	ESI 4607 <sup>S</sup> Engineering Analytics II	
<u>2</u>	Tech Elective Industrial Engineering			
14	Total Credits	12	Total Credits	
2017 median starting s		salary: \$62,957		Notes: Courses in bold must be completed with an overall grade point
	(NACE Spring 2017 Sa	Salary Survey)		<ul> <li>+ - Optional, but highly encouraged</li> <li>R - Required course</li> <li>F - Course offered only in the fall</li> </ul>
<u>General program inf</u>		<u>nfc</u>	ormation	semester (EIN and ESI courses are taught once a year) S – Course offered only in the spring semester (EIN and ESI courses are taught once a year) Chemistry will be applied as FKL Life Science.

## Information Technology

	First Year						
Fall	Semester	Spi	ring Semester				
3	CGS 1540 Intro to Databases for IT	3	COP 2512 IT Programming Fundament	tals			
3	ENC 1101 Composition I	3	MAD 2104 IT Discrete Math				
R	EGN 3000 Foundations of Engineering	3	ENC 1102 Composition II				
4	MAC 1147 Pre-Calculus	3	PHY 2020 Conceptual Physics				
3	FKL Human/Diversity & Global Elective	1	EGN 3000L Foundations of Eng Lab				
13	Total Credits	13	Total Credits				
	Second Year						
Fall	Semester	Spr	ing Semester	Sur	nmer		
3	COP 2513 Object-Oriented Programming	3	CIS 3213 Found. Of Cyber Security	3	COP 3515 Program		
3	STA 2023 Introductory Statistics I	3	FKL Life Science		Design for IT		
3	CGS 3303 IT Concepts	3	INR 3033 International Political Cultures	3	General Elective		
3	ECO 2013 Macroeconomics	<u>3</u>	PSY 2012 Psychological Science I	<u>3</u>	FKL Humanities		
	(Required FKL Social/Behavioral Elective)		(Req. FKL Social/Behavioral Elective)		(with HHCP)		
<u>3</u>	FKL Fine Arts						
15	Total Credits	12	Total Credits	9	Total Credits		
	Third Year						
Fall	Semester	Spi	ring Semester		Internship/Co-op		
3	COP 4538 Data Structures and Algorithms	3	CGS 3853 Web Systems for IT		List Company/employer		
3	CEN 3722 Human Computer Interfaces for IT	3	ENC 3246 Communication for Eng. (WI, 6	6A)	name and position		
3	CIS 3433 System Integration & Arch. For IT	3	CNT 4104 Computer Information Network	ks			
3	St. GenEd Humanities Elective	1	CNT 4104L Computer Info Networks Lab				
<u>3</u>	General Elective	3	IT Department Elective				
		<u>3</u>	IT Department Elective				
15	Total Credits	16	Total Credits				
	Fourth Year						
Fall	Semester	Spi	ring Semester				
3	COP 4703 Database Systems for IT	3	CIS 4935 Senior Project in IT (CD)				
3	CIS 4083 Cloud Computing for IT	3	CIS 4253 Ethics for Information Technolo	ogy (6	δA)		
3	CNT 4603 System Admin & Maintenance for IT	3	IT Department Elective				
3	IT Department Elective	<u>3</u>	IT Department Elective				

3 IT Department Elective3 IT Department Elective

15 Total Credits

12 Total Credits

2017 median starting salary: \$62,500 (NACE Spring 2017 Salary Survey) Note: Courses in bold must be completed with minimum grade of C, not C-.

General program information

## **Mechanical Engineering**

	First Year				
Fall Semester		Spring Semester			
3	ENC 1101 Composition I	3	ENC 1102 Composition II		
4	MAC 2281 or MAC 2311 Calculus I	4	MAC 2282 or MAC 2312 Calculus II		
3	CHS 2440 or CHM 2045 Chemistry I	3	PHY 2048 General Physics I		
1	CHS 2440L or CHM 2045L Chemistry Lab	1	PHY 2048L General Physics I Lab		
R	EGN 3000 Foundations of Engineering	(1)	PHZ 2102 <sup>†</sup> Problems Physics I		
1	EGN 3000L Foundations of Engineering Lab	<u>3</u>	FKL Fine Arts Elective		
<u>3</u>	St GenEd Core Humanities Elective (with 6A)				
15	Total Credits	14	(15) Total Credits		
	Second Year				
Fal	I Semester	Spri	ing Semester	Sı	ummer School
4	MAC 2283 or MAC 2313 Calculus III	3	* EGN 3343 Thermodynamics	1	EML 3035 Prog. Concepts
3	PHY 2049 General Physics II	3	* EML 3500 Mechanics of Solids	3	EGN 3443 Probability &
1	PHY 2049L General Physics II Lab	3	EGN 3321 Dynamics		Statistics for Engrs
3	EGN 3311 Statics		MAP 2302 Differential Equations	3	EML 3022 CAD
	EGN 3615 Engr Econ Social/Global Impltn	3	or EGN 3433 Mod Anlys Eng Sys	<u>3</u>	EGN 3365 Materials
<u>3</u>	(FKL Social & Behavioral Science)	<u>3</u>	St GenEd Social Science Elective		Engineering I
14	Total Credits	15	Total Credits	10	Total Credits
	Third Year				
Fal	I Semester	Spr	ing Semester		Internship/Co-op
3	EML 3041 Computational Methods	3	EGN 3373 Electrical Systems I		List Company/employer
3	EML 3701 Fluid Systems	3	EML 3303 Mechanical Engineering Lab	I	name and position
3	EML 4325 Mechanical Manufacturing Processes	3	EML 4501 Machine Design		
3	EML 3262 Kinematics & Dynamics of	3	EML 4106C Thermal Systems		
	Machinery	<u>3</u>	FKL Human/Diversity & Global Elective		
<u>3</u>	ENC 3246 Communication for Engrs (6A WI)				
15	Total Credits	15	Total Credits		
	Fourth Year				
Fal	l Semester	Sp	oring Semester		
3	EML 4123 Heat Transfer	3	EML 4312 Mechanical Controls		
3	EML 4302 Mechanical Engineering Lab II	3	EML 4551 Capstone Design (CD)		
3	EML 4220 Vibrations	3	Approved Technical/Design/Science Ele	ectiv	e
3	Approved Technical/Design/Science Elective	3	Approved Technical/Design/Science Ele	ctiv	e
<u>3</u>	Approved Technical/Design/Science Elective	<u>3</u>	FKL Humanities Elective (with HHCP)		
15	Total Credits	15	Total Credits		
	2017 median starting sa	lary: \$6	3,833	Not	te: Courses in bold must be
(NACE Spring 2017 Salary Survey)				cor ave † – R –	npleted with an overall grade poin erage of 3.00 • Optional, but highly encouraged. • Required course.

General program information

#### \* – High priority courses to be completed with a minimum grade of C Chemistry will be applied as FKL Life Science.

#### 

This Biomedical Engineering minor is a 15 credit hour program that is open to all engineering majors and other students that meet the prerequisites listed below. For engineering majors, at least 9 hours beyond the B.S. in any engineering discipline must be completed for the biomedical engineering minor. Student must register with the Department of Chemical & Biomedical Engineering undergraduate advisor prior to starting this minor program. Departments within the College of Engineering are currently developing additional courses that will be added to the list of courses that can be applied to this minor, so consultation with the advisor will ensure that students are informed of all offered courses.

#### 

This Computer Science minor is an 18 credit hour program that is open to all students, except for Computer Science & Engineering Department majors, that meet the prerequisites listed below. The Computer Science minor is very attractive to students in other engineering departments, and to students in Mathematics and the Sciences (including Physics, Chemistry, and Biology). Students must register with the Department of Computer Science and Engineering undergraduate advisor prior to starting this minor program. Consultation with the department undergraduate advisor will ensure that students are informed of all offered courses. All catalog prerequisites and registration requirements must be met for enrollment in any of the courses required for the minor. All students desiring to pursue the minor must meet the same entry and continuation requirements as a departmental major.

#### 

IT General Minor (15 credit hours) - The IT General Minor is aimed at providing a good understanding of the concepts underlying information technology while letting students choose four elective topics in which to specialize. These electives encompass a wide spectrum of topics such as programming, networking, web design, human computer interaction, and security management

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The IT Technical Minor enforces basic scientific prerequisites and requires students to attend three core IT courses meant to give them the conceptual and technical basis necessary to successfully dwell in more advanced topics. The elective part of the technical minor is composed of two electives to be chosen from a larger set of courses, including database systems and operating systems.





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