

# B.S. General Engineering

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(120 credits)

**First Year**

<b>1st Semester</b>		<b>Credits</b>
CHEM 121 or CHEM 125	Fundamentals of Chemical Principles I <sup>1</sup> or General Chemistry I	3
CHEM 125A	General Chemistry Lab I	1
FED 101	Fundamentals of Engineering Design <sup>1</sup>	2
ENGL 101	English Composition: Introduction to Academic Writing	3
MATH 111	Calculus I	4
PHYS 111	Physics I	3
PHYS 111A	Physics I Lab	1
FYS SEM	First-Year Student Seminar	0
<b>Term Credits</b>		<b>17</b>

**2nd Semester**

CHEM 122 or CHEM 126	Fundamentals of Chemical Principles II <sup>2</sup> or General Chemistry II	3
ENGL 102	English Composition: Introduction to Writing for Research	3
MATH 112	Calculus II	4
PHYS 121 or PHYS 122	Physics II <sup>3</sup> or Electricity & Magnetism ECE Appl	3
PHYS 121A	Physics II Lab	1
<b>Term Credits</b>		<b>14</b>

**Second Year****1st Semester**

Select one of the following:		3
CS 100	Roadmap to Computing <sup>4</sup>	
CS 101	Computer Programming and Problem Solving	
CS 106	Introduction to Computing	
CS 115	Introduction to Computer Science I in C++	
Select one of the following:		3
MATH 211	Calculus III A <sup>5</sup>	
MATH 213	Calculus III B	
Social Science GER ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/social-science-ger/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/social-science-ger/</a> )		3
History and Humanities GER 200 level ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/</a> )		3
ENGR 330	Applications of Microcontrollers and IoT devices <sup>6</sup>	3
<b>Term Credits</b>		<b>15</b>

**2nd Semester**

MATH 222	Differential Equations	4
MATH 333	Probability and Statistics <sup>7</sup>	3
General Engineering Elective (200 level) <sup>8</sup>		3
General Engineering Elective (200 level)		3
General Engineering Elective (200 level)		3
<b>Term Credits</b>		<b>16</b>

**Third Year****1st Semester**

History and Humanities GER 300+ level ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/</a> )		3
General Engineering Elective (200 level)		3

General Engineering Elective (200 level)	3
General Engineering Elective (200 level)	3
General Engineering Elective (300 level)	3
<b>Term Credits</b>	<b>15</b>
<b>2nd Semester</b>	
History and Humanities GER 300+ level ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/</a> )	3
ENGR 211 Professional Skills for Engineers I <sup>9</sup>	1
General Engineering Elective (300 level)	3
General Engineering Elective (300 level)	3
General Engineering Elective (300 level)	3
General Engineering Lab Elective (300 or 400 level)	3
<b>Term Credits</b>	<b>16</b>
<b>Fourth Year</b>	
<b>1st Semester</b>	
Humanities and Social Science Senior Seminar GER ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/</a> )	3
General Engineering Elective (300 level)	3
General Engineering Elective (300 level)	3
General Engineering Elective (400 level)	3
General Engineering Elective (400 level)	3
<b>Term Credits</b>	<b>15</b>
<b>2nd Semester</b>	
General Engineering Elective (400 level)	3
ENGR 400 Multidisciplinary Engineering Design Project	3
General Engineering Elective (400 level)	3
General Engineering Elective (400 level)	3
<b>Term Credits</b>	<b>12</b>
<b>Total Credits</b>	<b>120</b>

<sup>1</sup> Students interested in Biomedical, Chemical, Computer, Electrical, Materials Engineering should take CHEM 125.

<sup>2</sup> Students interested in Biomedical, Chemical, Materials Engineering should take CHEM 126.

<sup>3</sup> Students interested in Computer, Electrical Engineering should take PHYS 122.

<sup>4</sup> Students interested in Computer, Electrical Engineering should take CS 115.

<sup>5</sup> Students interested in Computer, Electrical and Mechanical Engineering should take MATH 213.

<sup>6</sup> Students interested in the Chemical or Materials Engineering use a General Engineering elective.

<sup>7</sup> Students interested in the Concentration in Quality and Reliability Engineering take MATH 244.

<sup>8</sup> Two of the 200 level General Engineering Elective must have a lab component associated with the course.

<sup>9</sup> ENGR 211 is required only for students who take Math 211 unless specified in a concentration.

200 level General Engineering elective - At least 4 from Engineering

300 level General Engineering elective - At least 4 from Engineering

400 level General Engineering elective - At least 3 from Engineering

## Concentration in Engineering Innovation and Intellectual Property

### First Year

#### 1st Semester

	<b>Credits</b>
CHEM 125 General Chemistry I	3
CHEM 125A General Chemistry Lab I	1
FED 101 Fundamentals of Engineering Design	2
ENGL 101 English Composition: Introduction to Academic Writing	3
MATH 111 Calculus I	4
PHYS 111 Physics I	3

PHYS 111A	Physics I Lab	1
FYS SEM	First-Year Student Seminar	0
<b>Term Credits</b>		<b>17</b>
<b>2nd Semester</b>		
CHEM 126	General Chemistry II	3
ENGL 102	English Composition: Introduction to Writing for Research	3
MATH 112	Calculus II	4
PHYS 121	Physics II	3
PHYS 121A	Physics II Lab	1
<b>Term Credits</b>		<b>14</b>
<b>Second Year</b>		
<b>1st Semester</b>		
CS 101 or CS 106	Computer Programming and Problem Solving or Introduction to Computing	3
MATH 211	Calculus III A	3
ENTR 210	Introduction to Entrepreneurship	3
PSY 210	Introduction to Psychology	3
MECH 234	Engineering Mechanics	2
ENGR 211	Professional Skills for Engineers I	1
<b>Term Credits</b>		<b>15</b>
<b>2nd Semester</b>		
MATH 222	Differential Equations	4
ENGR 320	Prototyping Essentials	3
PHYS 234	Physics III	3
ECE 231	Circuits and Systems I	3
MECH 237	Strength Of Materials	3
<b>Term Credits</b>		<b>16</b>
<b>Third Year</b>		
<b>1st Semester</b>		
COM 313	Technical Writing	3
MATH 333 or IE 331	Probability and Statistics or Applied Statistical Methods	3
ME 430	Introduction to Computer-Aided Design	3
PHIL 310	Logic	3
MGMT 290	Business Law I	3
ENGR 312	Professional Skills for Engineers II	1
<b>Term Credits</b>		<b>16</b>
<b>2nd Semester</b>		
HIST 320	Law and Evidence	3
ENGR 350	Intellectual Property for Engineers	3
PHIL 334	Engineering Ethics and Technological Practice: Philosophical Perspectives on Engineering	3
ENTR 330	Entrepreneurial Strategy	3
ENGR 330	Applications of Microcontrollers and IoT devices	3
<b>Term Credits</b>		<b>15</b>
<b>Fourth Year</b>		
<b>1st Semester</b>		
Humanities and Social Science Senior Seminar GER ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/</a> )		3
IE 447	Legal Aspects of Engineering	3
BME 303	Biological and Chemical Foundations of Biomedical Engineering	3
IE 455	Robotics and Programmable Logic Controllers	3

IE 492	Engineering Management	3
<b>Term Credits</b>		<b>15</b>
<b>2nd Semester</b>		
ENTR 440	Lean Startup Accelerator	3
ENGR 400	Multidisciplinary Engineering Design Project	3
IE 463	Invention and Entrepreneurship	3
ENGR 301	Engineering Applications of Data Science	3
<b>Term Credits</b>		<b>12</b>
<b>Total Credits</b>		<b>120</b>

## Concentration in Mechatronics

### First Year

<b>1st Semester</b>		<b>Credits</b>
CHEM 125	General Chemistry I	3
CHEM 125A	General Chemistry Lab I	1
FED 101	Fundamentals of Engineering Design	2
ENGL 101	English Composition: Introduction to Academic Writing	3
MATH 111	Calculus I	4
PHYS 111	Physics I	3
PHYS 111A	Physics I Lab	1
FYS SEM	First-Year Student Seminar	0
<b>Term Credits</b>		<b>17</b>

### 2nd Semester

CS 100	Roadmap to Computing	3
ENGL 102	English Composition: Introduction to Writing for Research	3
MATH 112	Calculus II	4
PHYS 122	Electricity & Magnetism ECE Appl	3
PHYS 121A	Physics II Lab	1
<b>Term Credits</b>		<b>14</b>

### Second Year

#### 1st Semester

ECE 231	Circuits and Systems I	3
MATH 213	Calculus III B	4
History and Humanities GER 200 level ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/</a> )		3
Social Science GER ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/social-science-ger/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/social-science-ger/</a> )		3
MECH 234	Engineering Mechanics	2
ENGR 211	Professional Skills for Engineers I	1
<b>Term Credits</b>		<b>16</b>

#### 2nd Semester

MATH 222	Differential Equations	4
ENGR 320	Prototyping Essentials	3
MECH 236	Dynamics	2
ME 231	Kinematics of Machinery	3
MECH 237	Strength Of Materials	3
<b>Term Credits</b>		<b>15</b>

### Third Year

#### 1st Semester

COM 313	Technical Writing	3
MATH 333 or IE 331	Probability and Statistics or Applied Statistical Methods	3

ME 430	Introduction to Computer-Aided Design	3
Technical Elective		3
BME 210	Processing Fund for Biol Signa	3
ENGR 312	Professional Skills for Engineers II	1
<b>Term Credits</b>		<b>16</b>
<b>2nd Semester</b>		
MATH 337	Linear Algebra	3
ENGR 301	Engineering Applications of Data Science	3
PHIL 334	Engineering Ethics and Technological Practice: Philosophical Perspectives on Engineering	3
ME 305	Introduction to System Dynamics	3
ENGR 330	Applications of Microcontrollers and IoT devices	3
<b>Term Credits</b>		<b>15</b>
<b>Fourth Year</b>		
<b>1st Semester</b>		
Humanities and Social Science Senior Seminar GER ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/</a> )		3
ENGR 423	Drone Science Fundamentals	3
ME 441	Computer Simulation and Analysis in Mechanical Engineering	3
IE 455	Robotics and Programmable Logic Controllers	3
Technical Elective		3
<b>Term Credits</b>		<b>15</b>
<b>2nd Semester</b>		
ENGR 424	Robotics Science Fundamentals	3
ENGR 400	Multidisciplinary Engineering Design Project	3
ENGR 350	Intellectual Property for Engineers	3
CS 440	Computer Vision	3
<b>Term Credits</b>		<b>12</b>
<b>Total Credits</b>		<b>120</b>

## Concentration in Quality and Reliability Engineering

### First Year

		<b>Credits</b>
<b>1st Semester</b>		
CHEM 125	General Chemistry I	3
CHEM 125A	General Chemistry Lab I	1
FED 101	Fundamentals of Engineering Design	2
ENGL 101	English Composition: Introduction to Academic Writing	3
MATH 111	Calculus I	4
PHYS 111	Physics I	3
PHYS 111A	Physics I Lab	1
FYS SEM	First-Year Student Seminar	0
<b>Term Credits</b>		<b>17</b>
<b>2nd Semester</b>		
CHEM 126	General Chemistry II	3
ENGL 102	English Composition: Introduction to Writing for Research	3
MATH 112	Calculus II	4
PHYS 121	Physics II	3
PHYS 121A	Physics II Lab	1
<b>Term Credits</b>		<b>14</b>

### Second Year

<b>1st Semester</b>		
CS 101 or CS 106	Computer Programming and Problem Solving or Introduction to Computing	3

MATH 211	Calculus III A	3
PHYS 234	Physics III	3
ECON 201	Economics	3
IE 203	Applications of Computer Graphics in Industrial Engineering	2
PHYS 231A	Physics III Lab	1
<b>Term Credits</b>		<b>15</b>
<b>2nd Semester</b>		
MATH 222	Differential Equations	4
ME 215	Engineering Materials and Processes	3
ECE 231	Circuits and Systems I	3
MECH 320	Statics and Strength of Materials	3
ENGR 211	Professional Skills for Engineers I	1
History and Humanities GER 200 level ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/</a> )		3
<b>Term Credits</b>		<b>17</b>
<b>Third Year</b>		
<b>1st Semester</b>		
COM 313	Technical Writing	3
ENGR 330	Applications of Microcontrollers and IoT devices	3
ME 430	Introduction to Computer-Aided Design	3
MATH 244	Introduction to Probability Theory	3
ENGR 320	Prototyping Essentials	3
ENGR 312	Professional Skills for Engineers II	1
<b>Term Credits</b>		<b>16</b>
<b>2nd Semester</b>		
MATH 341	Statistical Methods II	3
ENGR 360 Geometric	Dimensioning and Tolerancing and Applied Metrology	3
BME 303	Biological and Chemical Foundations of Biomedical Engineering	3
ENGR 301	Engineering Applications of Data Science	3
Technical Elective		3
<b>Term Credits</b>		<b>15</b>
<b>Fourth Year</b>		
<b>1st Semester</b>		
IE 355	Human Factors	3
IE 455	Robotics and Programmable Logic Controllers	3
ENGR 430 Engineering for Quality and Reliability		3
MATH 344	Regression Analysis	3
<b>Term Credits</b>		<b>12</b>
<b>2nd Semester</b>		
PHIL 334	Engineering Ethics and Technological Practice: Philosophical Perspectives on Engineering	3
ENGR 400	Multidisciplinary Engineering Design Project	3
Technical Elective		3
ENGR 425	Advanced Manufacturing Rotation	2
Humanities and Social Science Senior Seminar GER ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/</a> )		3
<b>Term Credits</b>		<b>14</b>
<b>Total Credits</b>		<b>120</b>

## Suggested Technical Electives

Code	Title	Credits
CHEM 243	Organic Chemistry I	3
ECE 232	Circuits and Systems II	3
MATH 337	Linear Algebra	3

## Concentration in Chemical Processing

### First Year

1st Semester		Credits
CHEM 125	General Chemistry I	3
CHEM 125A	General Chemistry Lab I	1
FED 101	Fundamentals of Engineering Design	2
ENGL 101	English Composition: Introduction to Academic Writing	3
MATH 111	Calculus I	4
PHYS 111	Physics I	3
PHYS 111A	Physics I Lab	1
FYS SEM	First-Year Student Seminar	0
<b>Term Credits</b>		<b>17</b>

### 2nd Semester

CHEM 126	General Chemistry II	3
ENGL 102	English Composition: Introduction to Writing for Research	3
MATH 112	Calculus II	4
PHYS 121	Physics II	3
PHYS 121A	Physics II Lab	1
CHE 101	Introduction to Chemical Engineering	1
<b>Term Credits</b>		<b>15</b>

### Second Year

#### 1st Semester

CS 115 or CS 106	Introduction to Computer Science I in C++ <sup>1</sup> or Introduction to Computing	3
MATH 211	Calculus III A	3
CHE 201	Material and Energy Balances	4
CHE 230	Chemical Engineering Thermodynamics I	3
History and Humanities GER 200 level ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/</a> )		3
ENGR 211	Professional Skills for Engineers I	1
<b>Term Credits</b>		<b>17</b>

#### 2nd Semester

MATH 222	Differential Equations	4
CHEM 243	Organic Chemistry I	3
CHEM 244A	Organic Chemistry I Laboratory	2
CHEM 236	Physical Chemistry for Chemical Engineers	4
CHE 260	Fluid Flow	3
<b>Term Credits</b>		<b>16</b>

### Third Year

#### 1st Semester

CHEM 339	Physical Chemistry Laboratory	2
MTEN 201	Introductory Principles of Materials Engineering	3
CHE 342	Chemical Engineering Thermodynamics II	3
COM 313	Technical Writing	3
IE 331	Applied Statistical Methods	3
<b>Term Credits</b>		<b>14</b>

**2nd Semester**

ENGR Elective		1
IE 335	Engineering Cost Analysis and Control	3
Social Science GER ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/social-science-ger/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/social-science-ger/</a> )		3
ENGR 301	Engineering Applications of Data Science	3
IE 355	Human Factors	3
<b>Term Credits</b>		<b>13</b>

**Fourth Year****1st Semester**

IE 461	Product Quality Assurance	3
MTEN 305	Materials Characterization Methods	4
ENGR 430	Engineering for Quality and Reliability	3
IE 455	Robotics and Programmable Logic Controllers <sup>2</sup>	3
History and Humanities GER 300+ level ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/</a> )		3
<b>Term Credits</b>		<b>16</b>

**2nd Semester**

IE 459	Supply Chain and Production Planning	3
ENGR 400	Multidisciplinary Engineering Design Project	3
Humanities and Social Science Senior Seminar GER ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/</a> )		3
ENGR 320	Prototyping Essentials	3
<b>Term Credits</b>		<b>12</b>
<b>Total Credits</b>		<b>120</b>

<sup>1</sup> Students interested in Chemical, Materials Engineering should take CS 115

<sup>2</sup> IE Elective can substitute. Choose one of the following courses-  
 IE 447 Legal Aspects of Engineering  
 IE 492 Engineering Management

**Concentration in Materials Manufacturing Systems****First Year****1st Semester**

		<b>Credits</b>
CHEM 125	General Chemistry I	3
CHEM 125A	General Chemistry Lab I	1
FED 101	Fundamentals of Engineering Design	2
ENGL 101	English Composition: Introduction to Academic Writing	3
MATH 111	Calculus I	4
PHYS 111	Physics I	3
PHYS 111A	Physics I Lab	1
FYS SEM	First-Year Student Seminar	0
<b>Term Credits</b>		<b>17</b>

**2nd Semester**

CHEM 126	General Chemistry II	3
ENGL 102	English Composition: Introduction to Writing for Research	3
MATH 112	Calculus II	4
PHYS 121	Physics II	3
PHYS 121A	Physics II Lab	1
MTEN 101	Introduction to Materials Engineering	1
<b>Term Credits</b>		<b>15</b>



**Second Year****1st Semester**

MATH 211	Calculus III A	3
History and Humanities GER 200 level ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/</a> )		3
MTEN 201	Introductory Principles of Materials Engineering	3
MECH 234	Engineering Mechanics	2
ENGR Elective (200 Level)		1
ENGR Elective (200 Level)		1

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<b>Term Credits</b>	<b>13</b>
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**2nd Semester**

MATH 222	Differential Equations	4
MTEN 205	Mechanical Behavior of Materials	4
ENGR 211	Professional Skills for Engineers I	1
CS 115	Introduction to Computer Science I in C++ <sup>1</sup>	3
or CS 106	or Introduction to Computing	
ENGR Elective (200 Level)		1

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<b>Term Credits</b>	<b>13</b>
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**Third Year****1st Semester**

MTEN 301	Thermodynamics of Materials	3
ENGR 320	Prototyping Essentials	3
MTEN 305	Materials Characterization Methods	4
COM 313	Technical Writing	3
IE 331	Applied Statistical Methods	3

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<b>Term Credits</b>	<b>16</b>
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**2nd Semester**

ENGR 360	Geometric Dimensioning and Tolerancing and Applied Metrology	3
Social Science GER ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/social-science-ger/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/social-science-ger/</a> )		3
ENGR 301	Engineering Applications of Data Science	3
History and Humanities GER 300+ level ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/</a> )		3
IE 335	Engineering Cost Analysis and Control	3

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<b>Term Credits</b>	<b>15</b>
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**Fourth Year****1st Semester**

IE 461	Product Quality Assurance	3
MTEN 309	Electronic, Optical, Magnetic and Thermal Properties of Materials	4
ECE 405	Electrical Engineering Principles	3
ENGR 430	Engineering for Quality and Reliability	3
IE 455	Robotics and Programmable Logic Controllers <sup>2</sup>	3

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<b>Term Credits</b>	<b>16</b>
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**2nd Semester**

IE 459	Supply Chain and Production Planning	3
ENGR 400	Multidisciplinary Engineering Design Project	3
Humanities and Social Science Senior Seminar GER ( <a href="http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/">http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/</a> )		3
IE 492	Engineering Management	3
ENGR 350	Intellectual Property for Engineers	3

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<b>Term Credits</b>	<b>15</b>
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<b>Total Credits</b>	<b>120</b>
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<sup>1</sup> Students interested in Chemical, Materials Engineering should take CS 115

<sup>2</sup> One of the following courses can substitute-  
IE 447 Legal Aspects of Engineering  
ENGR 424 Robotics Science Fundamentals

*This curriculum represents the maximum number of credits per semester for which a student is advised to register. A full-time credit load is 12 credits. First-year students are placed in a curriculum that positions them for success which may result in additional time needed to complete curriculum requirements. Continuing students should consult with their academic advisor to determine the appropriate credit load.*