Welcome to ISE!

In today’s complex and competitive world, industrial engineers are in great demand to design, improve, and operate integrated systems of people, materials, equipment, and energy. The industrial and systems engineering discipline applies fundamentals from the mathematical, physical, and engineering sciences to efficiently design and analyze large systems that serve industry and government both in manufacturing and service sectors.

The undergraduate industrial and systems engineering program at Rutgers provides students with a broad engineering education along with specialization in the industrial engineering and manufacturing fields. We believe that a broad education is necessary to understand the impact of engineering solutions in a global/societal context. Academic strength in mathematics, physics, and basic engineering science is required. Specialization is offered in mathematical modeling, quality engineering and statistical techniques, computer-aided design, computer-aided manufacturing, simulation, manufacturing processes, engineering economics, production planning and control, design of engineering systems and information technology. Students have access to state-of-the-art laboratory facilities where hands-on instruction is emphasized in robotics, machine vision, manufacturing, automated material handling, quality engineering, electronic and sensor devices, simulation, and computer information systems.

The undergraduate program focuses on classroom instruction fostered by learning in multi-disciplinary project-teams. These teams frequently formulate and find engineering solutions to real-world industry problems. The ability to communicate effectively is emphasized by having students provide both oral and written reports.

ISE graduates work in a number of areas including electronic, pharmaceutical, and other manufacturing; health services, transportation, distribution, and communication; and computers, finance, marketing, and management. Students pursue graduate studies in engineering and in management at leading institutions.

The ISE faculty is dedicated to excellence in teaching, research, and professional service. They bring experience, real-life industrial problems, and enthusiasm to the classroom, setting a standard for students to follow in their professional careers.
WELCOME TO INDUSTRIAL AND SYSTEMS ENGINEERING!

We have carefully prepared this handbook for you. It contains information about the undergraduate program in Industrial and Systems Engineering (ISE) at Rutgers. Here, you will find descriptions of the ISE curriculum and electives. We've also enclosed information on academic policies, department facilities, faculty advisors, and student societies.

Currently, students in the classes of 2016/2017/2018/2019 require a total of 129 credit hours with major credit hours totaling 62. This change updates the curriculum and provides design-focused engineering education.

The Department of Industrial and Systems Engineering offers courses in various areas including: work design and ergonomics, optimization, simulation modeling, probability, manufacturing processes, design of engineering systems, facilities layout, production planning and control, and quality engineering and statistics.

In addition, the department gives students the opportunity to attain hands-on experiences in the ISE labs with work design, manufacturing processes; computer controlled manufacturing systems, and quality engineering and statistics. Our labs include the Manufacturing Automation Lab, the Quality and Reliability Lab, the Microcomputer Lab, and the Manufacturing Processes Lab.

This handbook and other information about the Department of Industrial and Systems Engineering at Rutgers can be found on the web at http://www.ise.rutgers.edu. Our mailing address is Department of Industrial and Systems Engineering, Rutgers University, 96 Frelinghuysen Road, Piscataway, NJ 08854-8018; fax (732) 445-5467; telephone (848) 445-3654; email for the undergraduate director, Dr. James T. Luxhoj, is jluxhoj@rci.rutgers.edu.

Once again, we welcome you to the Department of Industrial and Systems Engineering. If you have any questions regarding your undergraduate study please feel free to stop by the departmental office. We are located in Room 201 of the CoRE Building. We are always available to help.

Enjoy Your Studies,

Dr. Mohsen Jafari, Chairman
Dr. James T. Luxhoj,
Undergraduate Director, CORE 210
Ms. Cynthia Ielmini
What Is Industrial Engineering?

According to the Institute of Industrial Engineers (1975), the Industrial Engineering profession is described as follows:

“Industrial Engineering is concerned with the design, improvement, and installation of integrated systems of people, materials, equipment, and energy. It draws upon specialized knowledge and skill in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design to specify, predict and evaluate the results to be obtained from such systems.”

What are the educational objectives of the Industrial and Systems Engineering Department at Rutgers University?

The Industrial Engineering Program educates its graduates to achieve the program educational objectives within a few years after graduation. More specifically, the IE curriculum prepares its majors so that, within a few years after graduation, graduates’ attainments are:

1. Professional positions that result in a strong understanding of the knowledge and skills of the engineering profession.
2. Specializations in industrial and systems engineering which enable them to achieve successful employment and academic opportunities.
3. Professional, intellectual and leadership skills necessary to lead a productive life and contribute to the economic advancement and quality of life in the region, state and the nation.

In order to meet these objectives, the department has designed its curriculum in order to insure the following student educational outcomes:

1. To prepare students to apply their creativity in solving complex engineering design problems, to approach unstructured problems, to synthesize and design potential solutions and to evaluate the impact of their solutions in the broader context of the organization or society.
2. To educate students with the ability to collect, analyze, and interpret data relevant to problems arising in the industrial engineering domain.
3. To provide students with analytical and computational skills to operate effectively within the industrial engineering domain through training in problem representation, abstraction, and validation.
4. To prepare students to function as professionals in the workplace by fostering their ability to form, facilitate, lead, coordinate, and participate in teams as well as understand organizational processes and behavior. To prepare students to effectively and convincingly present their solutions and to do so in the context of written, oral, and electronic media.
5. To provide students with the skills and ability to apply current technology to solve industrial problems.
6. To sensitize students to a need for and to provide an ability to accomplish life-long growth within the field/profession of industrial and systems engineering.
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1. INDUSTRIAL ENGINEERING CURRICULUM

1.1 CLASS OF 2016/2017/2018/2019

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<td>01:355:101</td>
<td>Expository Writing</td>
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<td>01:640:151</td>
<td>Calc Math Phy Sci</td>
<td>4</td>
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<td>01:750:123</td>
<td>Analytic Physics I</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>14:440:100</td>
<td>Intro to Engr</td>
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<td>Hum/Soc. Elective</td>
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<td>Calc Math Phy Sci</td>
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<td>01:750:123</td>
<td>Analytic Physics I</td>
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<td>01:640:251</td>
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<td>3</td>
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<tr>
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<td>01:750:229</td>
<td>Anal Phys II Lab</td>
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<td>Eng. Graphics</td>
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<td>Elements of EE</td>
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<td>14:540:382</td>
<td>Comp. Contr Mfg Sys</td>
<td>3M</td>
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<td>14:540:383</td>
<td>Comp. Contr Lab</td>
<td>1M</td>
</tr>
<tr>
<td>Senior Year</td>
<td>14:540:400</td>
<td>Design of Eng Syst. II</td>
<td>3M</td>
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<td>Quality Eng. Lab</td>
<td>1M</td>
</tr>
<tr>
<td></td>
<td>14:540:453</td>
<td>Prod Plan &amp; Control</td>
<td>3M</td>
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<td>14:332:402</td>
<td>Sustainable Energy</td>
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<td>Hum/Soc Elective</td>
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<td></td>
<td><strong>:</strong><em>:</em>__</td>
<td>Hum/Soc Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

M - Course is included in major average.
Total credit hours: 130.
Major credit hours total 63.

The Dept/Tech electives (List A & List B) for Class are given in Section 1.2.
1.2. Departmental/Technical Electives

Students are required to take one course from the Departmental/Technical Electives List A (Design Elective) and one course from the Departmental/Technical Electives List B. These two lists are given below.

If a student has a particular interest, the advisor may approve courses not on the list. For example, a student planning to go to medical school may wish to take biology and organic chemistry. These are appropriate technical electives that can be substituted for List B electives.

ISE and other graduate courses are possible electives for students with a 3.0 major average or greater. Students must obtain permission from the Undergraduate Director in order to take a graduate course. Note: This is a good practice for many students who are interested in pursuing graduate studies.

See the Undergraduate Director if you have any questions about ISE departmental technical electives

NOTE: Course # and title may be changed by other departments without our knowledge! Please inform the Undergraduate Director of any changes you are aware of.

List A - Design Electives
10:762:315 Designing Cities
10:762:316 Physical Design & Site Planning
10:975:316 Urban Design & Site Planning
10:762:472 Transportation Planning
10:762:475 Designing for Sustainability
10:762:492 Design Studio: Plan and Design a Sustainable Small Town
14:540:484 Design of a Manufacturing Enterprise
14:540:485 Industrial Information Systems
14:540:486 Automated Manufacturing Systems
14:540:487 Energy Systems Modeling and Optimization
14:635:405 Solar Cell Design and Processing
14:650:342 Design of Mechanical Components
14:650:388 Computer Aided Design in Mechanical Engineering
14:650:455 Design of Mechanisms

List B
01:220:322 Econometrics
01:640:250 Introductory Linear Algebra
01:960:384 Intermediate Statistical Analysis
11:375:434 Principles of Industrial Hygiene
14:332:476 Virtual Reality with corequisite 14:332:478 Virtual Reality Laboratory
14:440:404 Innovation and Entrepreneurship for Science and Technology
14:540:461 Engineering Law
14:540:485 Industrial Information Systems
14:540:486 Automated Manufacturing Systems
14:540:487 Energy Systems Modeling and Optimization
14:540:496 Co-Op Internship in ISE (upon approval of the undergrad director)
14:635:440 Electromechanical Materials and Devices
33:799:300 Global Procurement and Sourcing Strategies*
33:799:320 Fund of Sc Sol Sap*
33:799:380 Project Management*
33:799:460 Introduction to Six Sigma & Lean Manufacturing*
* Requires a 3.2 GPA or better.

NOTE: For students who are enrolled in the Certificate in Packaging Engineering, two of the four courses may be used for ISE electives. See Undergraduate Director for details.
2. ALL CLASSES - ACCEPTABLE HUMANITIES/SOCIAL SCIENCE ELECTIVES

2.1. List of Acceptable Humanities/Social Science Electives

NOTE: This list is based on the New Brunswick Undergraduate Catalog, 2009-2011, and supersedes all previous lists. Any new courses added after publication of the 2009-2011 Catalog are subject to review. Questions or appeals regarding course acceptability should be directed to the Associate Dean.

Rationale for H/SS Electives in the Curriculum: A good undergraduate education should provide more than the development of technical skills. Properly chosen, H/SS electives can complement your technical courses by helping you to develop an understanding of the problems facing our society, a historical consciousness, a sense of values, knowledge of other cultures, an appreciation of the fine arts, and an ability to think logically and communicate effectively. Think seriously about your choices, and use them to enhance your educational experience. Engineering students may also complete a minor or second major in these disciplines; see http://soe.rutgers.edu/oaa/declaration.php for more details.

School Requirements: All candidates for the B.S. degree must complete a minimum of 18 credits of humanities/social science courses including the following:

- 01:355:101;
- 01:220:102 AND 103. (Note: credit not granted for 220:102 or 220:103)
- Four free electives chosen from courses listed below (if 220:102/103 taken, choose 3 electives);
- Free electives must be selected in a manner such that at least two courses are at the 300/400 (upper) level, at least two courses, including one upper level, are from the same subject area; and at least two different subjects are represented. All courses may be from the same subject ONLY IF a minor or 2nd major in a H/SS subject is earned. Even with a minor/major, 2 upper level courses from this list must be chosen.
- Elementary language courses are normally NOT accepted for H/SS credit. However, four semesters of a language (2 elementary and 2 intermediate) that were not taken in high school and is not the student's native language will count as 1 general, 2 H/SS lower, and 1 H/SS upper elective. The second upper level H/SS elective must come from another subject unless a minor is earned.

For a list of the Humanities/Social Science Electives, please go the below link:

http://soe.rutgers.edu/sites/default/files/imce/pdfs/humanities_list.pdf

3. ACADEMIC STANDING

PROBATION: Do not take probation lightly. Each semester, students' grades are reviewed. The IE policy is that students may be on academic probation for any of the following reasons: if the term average falls below 1.7 for sophomores, below 1.8 for both juniors and seniors; if the major average falls below 1.9 for students with 5 semesters, below 1.9 for students with 6 semesters, below 2.0 for students with 7 or more semesters; or the university average falls below 1.0.

DISMISSAL: If you have been on probation twice during your Rutgers Engineering career, you have no chances left. If your grades are such that you would be eligible for probation again, you will be dismissed. These do not have to be consecutive terms on probation. If you have been on probation twice, you will be dismissed unless you get off probation. Do not take probation lightly. In addition, a student may be dismissed if the term average falls below 1.4 or if the major average falls below 1.6 in semester 5, 1.8 in semester 6, and 1.9 in semester 7.
4. SUMMARY OF ACADEMIC PROGRAMS

4.1. Five Year Dual Degree Program

The School of Engineering in cooperation with the liberal arts colleges at Douglass, Livingston, Rutgers, Camden and Newark offers cooperative five-year programs leading to a BS in Engineering and a BA in liberal arts major. The current Rutgers University Catalog gives the details of the program. To receive both degrees, it is necessary for the student to satisfy the following three requirements: (1) take all the courses required for the ISE degree; (2) take all courses required for the liberal arts major; and (3) make sure the total number of credits is the required number of ISE credits plus 30.

Some courses may satisfy both ISE and liberal arts requirements. For example, an ISE and Economics double major can satisfy engineering and liberal arts requirements with the sequence of courses Engineering Probability and Intermediate Statistics. In fact, it may be possible to fulfill the requirements for both degrees with fewer credits than the total ISE credits plus thirty. If that occurs, the student must take additional courses to satisfy item (3) above.

4.2. James J. Slade Scholar (Honors Program)

In the junior year, students with a GPA of 3.2 or better may apply for admission to this program. The program requires that you write a senior thesis. This program gives the student the opportunity to do independent research while still an undergraduate. Also, this program gives the student recognition (at graduation and with a certificate) for outstanding achievement.

4.3. Five Year BS/MBA Program

A joint program exists between The Rutgers Business School in New Brunswick and the School of Engineering. A student can receive an MBA within 12 months of receiving the BS in engineering. Students should apply early in the junior year. Careful course scheduling is required to fit several business courses in the junior and senior years. To apply, students need a GPA of 3.2 or better and a rank in the top quartile in the GMAT. See ISE Undergraduate Director for details.

4.4. Four Year and One Semester Co-Op Program

The co-op internship provides the student with the opportunity to practice and/or apply knowledge and skills in various industrial and systems engineering environments. This co-op internship is intended to provide a practical engineering experience to the student’s undergraduate education by integrating prior course work into a working engineering environment. In addition to receiving compensation for their on-site job experience, students earn credits for the educational benefits of the experience. The 6 co-op credits are in addition to the 129 credit hours required for graduation. Students may use 3 of the 6 co-op credits as Dept/Tech Elective (List B) under the approval of ISE Undergraduate Director. Students who choose the co-op internship option will complete their undergraduate degree requirements in the 9th semester. See page 12 for more details.

4.5. Study Abroad

There are several universities abroad that are suitable for engineering students. Opportunities exist for students to study at schools in Australia, the United Kingdom, Ireland, Germany, Argentina, Chile, France, China, Spain, Japan, Mexico, Israel, Turkey and South Korea. It is possible to create a program of study such that a student will not lose time in finishing ISE degree requirements. It is not a straightforward transfer of credit though. For information see Dean Bernath and the ISE Undergraduate Director. More information is available from the Rutgers Study Abroad Office at http://studyabroad.rutgers.edu
A Unique Opportunity

The Rutgers BS in Industrial Engineering/ MBA program is a customized study plan that allows you to earn both a bachelor’s degree and a Master’s of Business Administration degree within five years and one summer. The MBA concentration is in Supply Chain Management, a very exciting and emerging field. Normally, the sequence of degrees requires six years. This dual degree program offers you a unique opportunity to develop your engineering interest, as well as prepare yourself for a career in management or business.

If accepted into the program, during your Senior year, you could take 4 courses towards your MBA degree which will be offered at the Rutgers Business School’s New Brunswick’s campus. At the end of your Senior year, you must have successfully completed all undergraduate requirements for the Bachelor’s Degree. Enrollment in the Graduate business program will begin the summer after graduation. During your fifth year, you will complete your graduate studies and receive your MBA degree.

Next Steps?

Talk with the ISE Undergraduate Director regarding the ISE undergraduate college requirements and major requirements.

- Maintain a 3.2 or better grade point average.
- Take the GMAT during your junior year.
- Apply to the program in the spring semester of your junior year by June 15.

For more information about the Rutgers ISE Program, go to: http://www.ise.rutgers.edu

Admissions Requirements:

GPA of 3.2 or better.

Enrollment in Graduate business courses after your Senior year requires awarding of your Bachelor’s degree from the Rutgers School of Engineering.

For more information about the Rutgers Business School (RBS), go to: http://business.rutgers.edu

Source: http://www.ise.rutgers.edu
**BS/MBA Curriculum**
**In Supply Chain Management**

### Freshman Year (17 cr. Hrs.)

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<td>01:160:171</td>
<td>Intro to Experiment</td>
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<td>01:355:101</td>
<td>Expository Writing</td>
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<td>01:640:151</td>
<td>Calc Math Phy Sci</td>
<td>4</td>
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<tr>
<td>01:750:123</td>
<td>Analytic Physics I</td>
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### Sophomore Year (17 cr. Hrs.)

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<td>01:750:229</td>
<td>Anal Phys II Lab</td>
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<td>14:180:243</td>
<td>Mech of Solids</td>
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</tr>
<tr>
<td>14:540:201</td>
<td>Work Des &amp; Ergo</td>
<td>1M</td>
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<td>14:540:202</td>
<td>Work Des Lab</td>
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### Junior Year (17 cr. Hrs.)

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<td>14:332:373</td>
<td>Elements of EE</td>
<td>3M</td>
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<td>14:540:338</td>
<td>Prob. Models in OR</td>
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<td>Comp. Contr Mfg Sys</td>
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<td>Comp. Contr Lab</td>
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### Senior Year (16 cr. Hrs.)

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<tr>
<td>14:540:433</td>
<td>Quality Eng &amp; Stat</td>
<td>3M</td>
</tr>
<tr>
<td>14:540:434</td>
<td>Quality Eng. Lab</td>
<td>1M</td>
</tr>
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<td>14:540:453</td>
<td>Prod Plan &amp; Control</td>
<td>3M</td>
</tr>
<tr>
<td>33:010:310</td>
<td>Account for Eng.</td>
<td>3</td>
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<tr>
<td><em><strong>:</strong><strong>:</strong></em></td>
<td>Hum/Soc Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

### Senior Summer (12 cr. Hrs.)

- RBS courses 12

### Fifth Year (15 cr. Hrs.)

- RBS courses 15

### M – Course is included in major average.

- RBS – Rutgers Business School

**Total ISE credit hours: 130.**

**ISE Major credit hours total 63.**

**Note:** Some courses in the ISE curriculum will count towards the Rutgers MBA.
4.7 Co-Op Internship Option

540:496/497 CO-OP INTERNSHIP IN INDUSTRIAL AND SYSTEMS ENGINEERING
(6 CREDITS, PASS/NO CREDIT BASIS ONLY)

CATALOG DESCRIPTION:

The co-op internship program is designed to provide a practical engineering experience to the student’s undergraduate education by integrating prior course work into a working engineering environment. It presents a unique opportunity to the student to practice and/or apply knowledge and skills in various industrial and systems engineering environments. The credits earned are for the educational benefits of the experience. Students may use 3 of the 6 co-op credits as Dept/Tech Elec (List B) upon approval of the ISE Undergraduate Director.

Prerequisite: The normal prerequisite is 90 credits completed with a cumulative grade point average of at least 2.5. Students may be approved with slightly fewer credits at the discretion of the Undergraduate Director.

Course Outline: The students must satisfy the following criteria to be eligible for an internship:

The co-op internship must be with the same company for six consecutive months, normally the spring and the summer semester.

Note that the 6 credits shown on page 17 are in addition to the 129 credit hours required for graduation unless the student is approved to use 3 credits as a Dept/Tech elective. Students who choose the co-op internship option will normally complete their undergraduate degree requirements in the 9th semester.

The following are the requirements to satisfy the undergraduate activities for credit:

1. A written proposal must be submitted to the Department by the student. The proposal must be approved by the Undergraduate Director. The written proposal should include the offer letter from the company, educational benefits, engineering related responsibilities at the work site, project tasks, and the plan for evaluation.
2. A suitable level of responsibility must be proposed and carried out under the supervision of a practicing professional and a final report must be presented to the Undergraduate Director.
3. The registration is by special permission only, obtained from the Undergraduate Director.
4. Students hired as technicians within the Department cannot use this to fulfill the Co-op Internship requirement.
5. All internship work done for 3 credits of Technical elective will be documented in a weekly report to the Undergraduate Director in addition to the final report.
6. Students on co-op must be registered for co-op credit during the semesters that they are working.
**ISE Curriculum (Co-op Option)**

If you plan to pursue a co-op, it is important that you make an appointment with the ISE Undergraduate Director, prior to the start of your co-op to discuss implementation details. All ISE co-ops must be approved by the ISE Undergraduate Director.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>(17 cr. hrs.)</th>
<th>(18 cr. hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01:160:171 Intro to Experiment</td>
<td>1</td>
<td>01:640:152 Calc Math Phy Sci</td>
</tr>
<tr>
<td>01:355:101 Expository Writing</td>
<td>3</td>
<td>01:750:124 Analytic Physics I</td>
</tr>
<tr>
<td>01:750:123 Analytic Physics I</td>
<td>2</td>
<td>14:440:221 Engr Mech-Static</td>
</tr>
<tr>
<td>14:440:100 Intro to Engr</td>
<td>1</td>
<td>: : : : Hum/Soc Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>(17 cr. hrs.)</th>
<th>(17 cr. hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01:640:251 Multivar Calc</td>
<td>4</td>
<td>01:220:102 Intro to Micro Econ</td>
</tr>
<tr>
<td>01:750:227 Analytic Phys IIA</td>
<td>3</td>
<td>01:640:244 Diff Eqns Eng &amp; Ph</td>
</tr>
<tr>
<td>01:750:229 Anal Phys II Lab</td>
<td>1</td>
<td>01:750:228 Analytic Physics IIB</td>
</tr>
<tr>
<td>14:540:202 Work Des Lab</td>
<td>1M</td>
<td>14:540:210 Eng Probability</td>
</tr>
<tr>
<td>14:540:213 IE Lab</td>
<td>2M</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>(17 cr. hrs.)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>01:355:302 Sci &amp; Tech Writing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>14:180:215 Eng Graphics</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14:332:373 Elements of EE</td>
<td>3M</td>
<td></td>
</tr>
<tr>
<td>14:635:407 Mech Prop Materials</td>
<td>3M</td>
<td></td>
</tr>
<tr>
<td>14:540:338 Prob Models in OR</td>
<td>3M</td>
<td></td>
</tr>
<tr>
<td>14:540:382 Comp Contr Mfg Sys</td>
<td>3M</td>
<td></td>
</tr>
<tr>
<td>14:540:383 Comp Contr Lab</td>
<td>1M</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fourth Year</th>
<th>(16 cr. hrs.)</th>
<th>(16 cr. hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:540:343 Eng Economics</td>
<td>3M</td>
<td>14:540:303 Mfg Processes</td>
</tr>
<tr>
<td>14:540:433 Quality Eng &amp; Stat</td>
<td>3M</td>
<td>14:540:304 Mfg. Processes Lab</td>
</tr>
<tr>
<td>14:540:434 Quality Eng Lab</td>
<td>1M</td>
<td>14:540:311 Deter Models in OR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fifth Year</th>
<th>(12 cr. hrs.)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>14:540:400 Design of Eng Syst II</td>
<td>3M</td>
<td></td>
</tr>
<tr>
<td>14:540:453 Prod Plan &amp; Control</td>
<td>3M</td>
<td></td>
</tr>
<tr>
<td>33:010:310 Account for Eng</td>
<td>3M</td>
<td></td>
</tr>
</tbody>
</table>

M – Course is included in major average.
Total credit hours: 136.
Major credit hours total: 63.

The Dept/Tech electives (List A & List B) are given in Section 1.2 of this handbook.
5. ACADEMIC POLICIES

This handbook has been compiled for undergraduate Industrial and Systems Engineering students. The department wants you to be aware of your degree requirements and of changes in college and university rules. We welcome suggestions for new material for the handbook and clarifications of material already included.

When you declare an engineering major, a check-list of course requirements is put into your folder. As you complete courses, the Dean's staff crosses the courses off the list. The folders are kept in the Dean's Office in the Engineering Building (Room B100). During registration periods the folders are available to the class advisor and students have the opportunity to see their folders.

Each class has a departmental faculty advisor as indicated on the list on page 30 of this handbook. Your advisor will post special office hours during registration periods. At other times during the semester, you may make an appointment with your advisor if the need arises. It is really sensible to make appointments (and appear on time) to save your own time. Faculty members are busy and have irregular schedules so it may be inefficient to just "stop by".

Keep track of your own progress through the ISE program and speak with your advisor when you run into academic or other problems. During registration, look at the check-list of courses in your folder to make sure your understanding of your status agrees with the view of the School of Engineering. It is especially important for graduating seniors to check their folders with their advisors to ensure that summer courses, transfer credits, and electives have been recorded as expected.

Before meeting with your advisor each student should be well informed. Please be sure to read this handbook and the current New Brunswick Undergraduate Catalog. In particular, students should be familiar with the sections regarding ISE degree requirements, ISE courses, Academic Policies and Procedures, and University Policies and Procedures.

5.1. Major Average

The courses that are included in the major average are marked "M" on the ISE curriculum. To graduate, your major average must be 2.0 or greater. If you fail a course and then repeat it, both grades are computed into your major average.

Every semester, compute your major average. Keep track of it carefully.

When you register, be sure to put an "M" next to your Dept/Tech elective on the registration card. The computer system cannot keep track of all the possible Dept/Tech electives.

5.2. Courses Included In Major Average

<table>
<thead>
<tr>
<th>BIORESOURCE ENG. (127/128/129)</th>
<th>CHEMICAL ENGINEERING (155/156)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 127 courses except 127:100</td>
<td>All 155 courses</td>
</tr>
<tr>
<td>All option required</td>
<td>115:301, 313</td>
</tr>
<tr>
<td>All option required</td>
<td>119:390</td>
</tr>
<tr>
<td>155:204, 303, 304, 308, 411</td>
<td>160:307, 308, 311, 323, 324</td>
</tr>
<tr>
<td>180:243, 318, 331, 345, 387, 389, 431</td>
<td>325, 341, 342</td>
</tr>
<tr>
<td>332:373, 375</td>
<td>332:373</td>
</tr>
</tbody>
</table>
375:405
400:201, 202, 402, 411, 419
460:101
530:211, 321
650:351
704:351
780:382
930:266
All technical electives

CIVIL ENGINEERING (180/181)

400:201, 202, 402, 411, 419
460:101
All technical electives

ELECTRICAL ENGINEERING (332/331)

All 332 courses
All technical electives

APPLIED SCIENCE (073)

All engineering electives
All technical electives
All math/science electives

INDUSTRIAL & SYSTEMS ENGINEERING (540/541)
All 540 courses

33:010:310
332:373
375

5.3. Withdrawal From Courses

It happens, unfortunately, that students encounter major problems during their college years. Don't wait to be dismissed from the School of Engineering to seek help. Take responsibility for your situation. If you know you are unable to do the required work, you must do what is necessary to let the college know of your difficulty. Further, there are many resources at Rutgers that can help you with your situation - from substance abuse to the death of a parent or friend.

**Here are the rules:** If you fail a course, it is computed into your university and major averages. If you drop a course, it is not computed into these averages.

You may withdraw from courses up to the 8th week without permission. Between the 8th and 12th weeks you may withdraw with the permission of Dean Bernath. If you are severely behind in your course work, you may get permission from the Dean. After the 12th week, permission from the Dean is required and your reason for withdrawal must be significant and beyond your control.

5.4. Course Substitution

As a matter of policy, there are no course substitutions for ISE courses. If there is an excellent reason, with the permission of the Undergraduate Director, students may substitute courses from other schools for electives or for required courses not given in the ISE department.
5.5. Academic Dishonesty

The Industrial and Systems Engineering Department expects each student to conduct him or herself in a professional manner. The policy of the ISE Department is as follows: we do not hesitate to report offenses of cheating to the college or the university. An engineer starting out a career cannot afford to have this kind of report on his or her record. A student who gives information is considered guilty as well as a student who receives information.

The University Policy on Academic Dishonesty is carefully spelled out in your catalog. Note that copying from or giving others assistance or using forbidden material on an hourly or final examination is a level three violation. The recommended sanction is suspension from the university for one or more terms with a notation of academic disciplinary suspension placed on the student's transcript.

6. UNDERGRADUATE TRACKS

The ISE program provides tracks that enable students to choose a specialization area in order to emphasize specific areas of interest. The ISE curriculum offers four tracks as shown and explained below:

ISE Undergraduate Tracks

Financial Systems Track

Requires a total of 9 credit hours. (3 credit hours used as part of List B Dpt/Tech Elec)

Required:
33:390:300 Introduction to Financial Management (Fall, Spring, Summer)

Select two:
16:540:530 Forecasting and Time Series Analysis (Fall)
16:540:575 Advanced Engineering Economics I (Fall or Spring)
33:390:380 Investment Analysis (Spring, Summer)
33:390:400 Corporate Finance (Spring, Summer)

Note: Course substitutions are accepted with permission of the Undergraduate Director.
IMPORTANT:
In order to complete the ISE Financial Systems Track, you must complete certain prerequisites and follow prescribed administrative processes.

NOTES:

33:390:300 Introduction to Financial Management (Fall, Spring, Summer)
The prerequisites for this course are calculus, economics (either 01:220:102 Intro to Micro Economics or 14:540:343 Engineering Economics), 33:010:310 Accounting for Engineers, statistics, and computer programming. The statistics prerequisite will be met when you successfully complete 14:540:210 Engineering Probability.

Note that with the ISE Financial Systems Track, you must take 33:010:310 Accounting for engineers some time before the Fall semester of your senior year. If you are following the prescribed ISE undergraduate curriculum and have completed 33:010:310 Accounting for Engineers in the Fall semester of your junior year (at least prior to the Fall semester of senior year), then you may register for 33:390:300 Introduction to Financial Management in the Fall semester of your senior year (or Summer after your junior year). Note that taking the 33:010:310 Accounting for Engineers in the Fall semester of your junior year is an exception to the base ISE curriculum.

33:390:300 Introduction to Financial Management is a prerequisite for both:

33:390:380 Investment Analysis (Spring, Summer)
33:390:400 Corporate Finance (Spring, Summer)

After completing 33:390:300 Introduction to Financial Management in the Fall semester of your senior year (or Summer after your junior year), you are then able to register for 33:390:380 Investment Analysis and 33:390:400 Corporate Finance in the Spring semester of your senior year.

Special Permission Numbers for the ISE Financial Systems Track:
The process for obtaining a special permission # for the Rutgers Business School courses is that the ISE Undergraduate Director will verify that the ISE students have met the prerequisites for 33:390:300 (and 33:390:380 and 33:390:400 as well) and then send a confirmation e-mail to the Undergraduate Program Coordinator at the Rutgers Business School. The ISE students will then be advised to contact the Rutgers Business School Undergraduate Program Coordinator directly for the special permission #.

Manufacturing Engineering Track

Requires a total of 9 credit hours. (3 credit hours used as part of List B Dpt/Tech Elec)

14:540:486 Automated Manufacturing Systems

Select two:
14:540:485 Industrial Information Systems
14:150:330 Introduction to Nanomaterials Science and Engineering (open to school 14)
16:540:520 Supply Chain and Logistics Engineering (Requires 3.0 GPA)

Note: Course substitutions are accepted with permission of the Undergraduate Director.
7. ISE PREREQUISITE/COREQUISITE

ISE Prerequisite / Corequisite Flow

Corequisite

Prerequisite
8. UNDERGRADUATE COURSE DESCRIPTIONS

Note: M denotes course is included in major average

14:540:201 Work Design and Ergonomics (3M)
Corequisite: 14:540:202, Prerequisite: 01:640:151 or 21:640:135 or 50:640:121 or 01:640:191
Man-machine analysis, motion economy, time study, predetermined time systems, work sampling; introduction to robotics, facilities layout, material handling; introduction to ergonomics and anthropometric, biomechanical, and human-machine interface models.

14:540:202 Work Design and Ergonomics Laboratory (1M)
Corequisite: 14:540:201, Prerequisite: 01:640:151 or 21:640:135 or 50:640:121 or 01:640:191
Experiments in robotics, time study, work measurement, workplace design and the human-machine interface, facilities layout.

14:540:210 Engineering Probability (3M)
Prerequisite: 01:640:144 or 01:640:151, 152, 154 or 191, 192 or 21:640:135, 136 or 50:640:121, 122
Probability problems in engineering, conditional probability, discrete and continuous distributions, functions of random variables, interval estimates.

14:540:213 Industrial Engineering Laboratory (2M)
Prerequisite: 01:640:151 or 21:640:135 or 50:640:121 or 01:640:191
Introduction to programming, fundamental data types, flow control, and function; arrays, pointers, and do loops; algorithms and flow charts; GUI concepts.

14:540:303 Manufacturing Processes (3M)
Corequisite: 14:540:304, Prerequisite: 14:440:221, 14:635:407

14:540:304 Manufacturing Process Laboratory (1M)
Corequisite: 14:540:303
Experiments on machine tools: lathes, drilling machines, milling machines, and CNC milling machines; robot workplace design and computer control of machine tools.

14:540:305,306 Honor Candidacy Problems
Prerequisite: Permission of departmental chairperson. Prerequisite for industrial engineering students who wish to be James J. Slade Scholars.
Extensive reading and study in a particular problem area of industrial engineering under the guidance of a faculty member.

14:540:311 Deterministic Models in Operations Research (3M)
Prerequisite: 01:640:244 or 21:640:314 or 50:640:314
Elements of modeling and problem solving. Use of a software package like LINDO, EXCEL to solve real life industrial engineering problems. Linear programming, duality, sensitivity analysis, integer programming, transportation and assignment problems.

14:540:338 Probability Models in Operations Research (3M)
Prerequisite: 14:540:210, 01:640:244 or 21:640:314 or 50:640:314
Modeling and decision making under uncertainty. Markov chains, poisson processes, inventory models and queueing systems.
14:540:343 Engineering Economics (3M)
Open only to junior and senior engineering students.
Economic decisions involving engineering alternatives, annual cost, present worth, rate of return, and benefit-to-cost; before and after tax replacement economy; organizational financing; break-even charts; unit and minimum-cost public sector studies.

14:540:382 Computer Control of Manufacturing Systems (3M)
Corequisite: 14:540:383
Programmable automation applied to manufacturing. Computer architecture, sensors and automatic data acquisition, computer control of actuators, continuous and discrete control of processes, computer integration, and local area networks.

14:540:383 Computer Control of Manufacturing Systems Laboratory (1M)
Corequisite: 14:540:382
Use of microcomputers and industrial controllers in controlling machines and processes. Assembly language programming, ladder logic programming, and interfacing controllers to sensors and actuators. Experiments in manufacturing applications.

14:540:384 Simulation Models in Industrial Engineering (3M)
Prerequisite: 14:540:210, 14:540:338
Modeling and analysis of industrial and service systems using ARENA, simulation modeling perspectives, discrete event and continuous simulation, simulation languages, statistical aspects of simulation.

14:540:399 Design of Engineering Systems I (3M)
Prerequisites or Corequisites: 14:540:303, 14:540:304, 14:540:382, 14:540:384
Design principles, material selection, design for assembly, design for manufacturing, and effect of environmental issues on product design.

14:540:400 Design of Engineering Systems II (3M)
Prerequisite: 14:540:399,
OPEN TO 540 STUDENTS ONLY
A team approach to the redesign of a "real-life" product. Alternative engineering plans for improved designs will be developed and implemented. Both written and oral reports will be completed.

14:540:433 Quality Engineering and Statistics (3M)
Prerequisite or Corequisites: 14:540:210, 540:434
Statistical methods for monitoring and improving product quality and decreasing variation. Factorial experiments, variables and attribute control charts, acceptance sampling, on- and off-line process controls.

14:540:434 Quality Engineering Laboratory (1M)
Corequisite: 14:540:433
Practical application of quality engineering methodologies, statistical software, gage studies, online process control, design of experiments to improve product design, industrial manufacturing processes, and system design.

14:540:453 Production Planning and Control (3M)
Prerequisite: 14:540:311, 338.
Coordination of activities of both manufacturing and service systems. Systems design; input and output; planning and scheduling. Decision-making problems employing mathematical techniques of linear programming. Sequencing jobs on machines and line balancing techniques.

14:540:461 Engineering Law (3M)
Prerequisite: Permission of department. Open only to seniors and graduate students in engineering.
Legal and ethical aspects of engineering; bids, awards, and negotiated contracts. Liabilities to the public and to employees, contract labor law. Contracts, patents, copyrights, trademarks, and engineering specifications.
14:540:462 Facilities Layout and Materials Handling (3M)
Prerequisites: 14:540:201, 303
Fundamentals of the design, layout, and location of industrial and nonmanufacturing facilities. Selection of machines and material handling equipment and their efficient arrangement. Emphasis on quantitative methods. Warehouse layout. Facility location theory.

14:540:484 Design of an Industrial Enterprise (3M)
Open to senior industrial engineering majors and graduate students.
Senior-level capstone course. Students in small groups select product(s) to be manufactured, and design and justify the enterprise.

14:540:485 Industrial Information Systems (3M)
Design of information systems for integrated manufacturing. Modeling, specification, and implementation of factory information systems. Relational database model and structured query language. Methods of automatic data acquisition and integration of factory floor information with factory host database for production planning and control.

14:540:486 Automated Manufacturing Systems (3M)
Introduction to computer-aided design and computer-aided manufacturing (CAD/CAM), numerical control, hardware and programming, mechatronics systems, robotics hardware and programming, and machine vision with applications in manufacturing.

14:540:487 Energy Systems Modeling and Optimization (3M)
Prerequisite: 14:540:311 Deterministic Models in OR, 14:332:402 Sustainable Energy: Choosing among Options
This course addresses the design, analysis, modeling and optimization of selected energy systems (including conventional fossil fuels and renewable wind and solar). This course will provide the basis for applying mathematical modeling and optimization techniques in energy systems. A set of projects and case studies focused on modeling and optimization of a variety of energy systems will be assigned to students and discussed in details. The course will have hands on experience with data collection, experimentation, simulation and optimization tools as they apply to energy systems.

14:540:488 Design of Decision Support Systems (3M)
Prerequisite: 14:540:485
Designing, building and testing computer systems that emulate human thinking and can draw conclusions based on incomplete and fuzzy data. Design and implementation of user interfaces. Students are required to design and build a decision support system. Students will use various test tools to validate their systems.

14:540:491, 492 Special Problems
Studies in phases of industrial engineering of special interest.

14:540:496, 497 Co-op Internship in Industrial Engineering (3,3)
Prerequisite: Permission of department, Graded Pass/No credit.
Intended to provide a capstone experience to the student’s undergraduate studies by integrating prior course work into a working industrial engineering professional environment. Credits earned for the educational benefits of the experience and granted only for a continuous, six-month, full-time assignment.

9. STUDENT SOCIETIES

ALPHA PI MU

Alpha Pi Mu is the Industrial Engineering Honor Society. Both academic excellence and leadership in service activities is emphasized for membership. Scholarship opportunities are also available. Faculty Advisor: Dr. Baykal-Gursoy
INSTITUTE OF INDUSTRIAL ENGINEERS (IIE)

The student chapter of IIE at Rutgers University is committed to the promotion of the industrial engineering profession. Professional activities include plant tours, industry speakers, alumni night, technical paper contests, and an engineering outreach program. Social activities include fall and Spring picnics, Freshman night, and a holiday mixer. By joining this society, each student receives a complimentary copy of Industrial Engineering with dues payment. Faculty Advisor: Dr. Luxhoj

SOCIETY OF MANUFACTURING ENGINEERS (SME)

The student chapter of SME at Rutgers University is committed to the promotion of manufacturing engineering. There are plant tours, industry speakers, professional development conferences, certification and scholarship opportunities. Social activities include joint picnics with IIE student chapter and meetings. Upon joining this society, each student receives a free subscription to Manufacturing Engineering with dues payment. Faculty Advisor: Dr. Ozel

TAU BETA PI

Tau Beta Pi is the National Engineering Honor Society. Academic excellence and service to the University community are stressed. Membership is open to juniors and seniors who rank near the very top in their respective classes. Faculty Advisor: Dr. Luxhoj

10. ISE FACULTY

Susan Albin is Professor in Industrial and Systems Engineering. Her areas of research are quality engineering, process monitoring and control in high dimensional space, data mining and stochastic modeling. Her work has been applied in areas including medical device manufacturing, semiconductor manufacturing, food processing, advanced display technology, and plastics recycling. Prof. Albin's research has been supported by NSF, FAA, DOD, the Council for Solid Waste Solutions, and industrial partners. Prof. Albin received her D.Eng.Sc in Operations Research from Columbia University and her MS and BS in Industrial Engineering from NYU. Prof. Albin was the 2010 President of INFORMS, the Institute for Operations Research and the Management Sciences, the largest professional society in the world for educators, investigators, scientists, students, managers, and consultants in the field of Operations Research. She has served as INFORMS Secretary and as a Member of the Board of Directors and was the founding chair of the INFORMS Section on Quality, Statistics and Reliability advisory board. Prof. Albin served as the Editor-in-Chief of IIE Transactions, the flagship journal of the Industrial Engineering profession and also as the Focus Issue Editor for Quality and Reliability Engineering. She served as Director of the Rutgers Graduate Program in Industrial and Systems Engineering for 14 years and, as a visiting professor at Peninsula Technikon in South Africa, helped establish their program in Quality Engineering. Prof. Albin has been a keynote speaker at conferences in China and Brazil. She is the recipient of the Rutgers Engineering Governing Council Excellence in Teaching Award and the Exxon Education Foundation Award. She is a Fellow of IIE, the Institute of Industrial Engineers and a recipient of the INFORMS George Kimball Medal.

Melike Baykal-Gursoy is an Associate Professor, in the department of Industrial and Systems Engineering at Rutgers University. She received her BS in Electrical Engineering and hr MS in Electrical Engineering with a major in Control from Bogazici University, Istanbul, Turkey. She received her doctorate in Systems Engineering from the University of Pennsylvania, Philadelphia. Her specific fields of interest include stochastic modeling, queuing, Markov decision processes, stochastic games, and their applications to transportation and supply chain systems. Dr. Baykal-Gursoy's research activities are in the areas of modeling, optimization and control of stochastic systems, such as transportation, telecommunication and supply chain networks. She is developing new models that will realistically represent complex phenomena such as congestion; traffic flow interrupted by random incidents; or retailer's behavior when selling substitutable products. She is developing optimization algorithms for adjustment of inventories in supply chains, for incident response and resource allocation in incident and emergency management, for dynamic traffic flow.
management under incidents, and for stochastic games. Dr. Baykal-Gursoy is currently focusing on the analysis and mitigation of congestion; on infrastructure security; on minimizing the effect of extreme weather events on human health; and on finding optimal production policies for competing retailers selling substitutable products when demand and yield are uncertain. Dr. Baykal-Gursoy teaches courses in optimization, stochastic processes, queueing theory, inventory control, supply chains and logistics, process modeling and control, and time series analysis. Her research and teaching have been supported through grants from NSF, United Nations, DOD, Rutgers Transportation Coordinating Council/Federal Transit Administration, Rutgers University Center for Disaster Preparedness and Emergency Response, and Rutgers Academic Excellence Fund. She is a member of INFORMS, and is listed in Who’s Who in America. Dr. Baykal-Gursoy has received the 2008-2009 Rutgers Engineering Governing Council Excellence in Teaching Award in I&SE.

Professor Thomas Boucher received his BS in Electrical Engineering from the University of Rhode Island, an MBA from Northwestern University, and an MS and Ph.D. in Industrial Engineering from Columbia University. His teaching and research interests include engineering economics, manufacturing automation, and production planning and control. His research has been sponsored by NSF, the Defense Logistics Agency, the Robert Wood Johnson Foundation and industry. He is the author of “Computer Automation in Manufacturing,” (Chapman-Hall, 1996) and co-author of “Analysis and Control of Production Systems,” (Prentice-Hall, 1994) and “Design of Industrial Information Systems,” (Elsevier, 2006). The latter book won the 2007 Book-of-the-Year Award from the Institute of Industrial Engineers. He is a four-time winner of the Eugene L. Grant Award for his journal articles in The Engineering Economist and he is the 2002 recipient of the Wellington Award for outstanding contributions in the field of engineering economics. Dr. Boucher has served as a department editor for The Engineering Economist and IIE Transactions. He is currently Editor-in-Chief for The Engineering Economist and is an editorial board member of the International Journal of Industrial and Systems Engineering. He is a senior member of IIE, SME, and IEEE and is listed in Who’s Who in Science and Engineering and Who’s Who in America.

Professor David W. Coit received his BS in Mechanical Engineering from Cornell University, an MBA from Rensselaer Polytechnic Institute, and MS and PhD degrees in Industrial Engineering from the University of Pittsburgh. His research interests are in the areas of reliability, optimization and energy systems modeling. In 1999, he was awarded a CAREER grant from the NSF to develop reliability optimization strategies that consider reliability estimation uncertainty. Previously, he worked for twelve years at IIT Research Institute (IITRI), Rome, NY, where he was a reliability engineer and project manager, and then later, the Manager of Engineering at IITRI’s Assurance Technology Center. He is a member of IIE, INFORMS.

E. A. Elsayed is Distinguished Professor and Interim Chairman of the Department of Industrial and Systems Engineering, Rutgers University. He is also the Director of the NSF/Industry/University Co-operative Research Center for Quality and Reliability Engineering. His research interests are in the areas of quality and reliability engineering and Production Planning and Control. He is a co-author of Quality Engineering in Production Systems, McGraw Hill Book Company, 1989. He is also the author of Reliability Engineering, Addison-Wesley, 1996. These two books received the 1990 and 1997 IIE Joint Publishers Book-of-the-Year Award respectively. His recent book Reliability Engineering 2nd Edition, Wiley, 2012 received the 2013 Outstanding IIE Publication.

Dr. Elsayed is also a co-author of Analysis and control of Production Systems, Prentice-Hall, 2nd Edition, 1994. His research has been funded by the DoD, FAA, NSF and industry. Dr. Elsayed has been a consultant for AT&T Bell Laboratories, Ingersoll-Rand, Johnson & Johnson, Personal Products, AT&T Communications, BellCore and other companies. He served as the Editor-in-Chief of the IIE Transactions and the Editor of the IIE Transactions on Quality and Reliability Engineering. He is Editor-in-Chief of Quality Technology and Quality Management. Dr. Elsayed is also the Editor of the International Journal of Reliability, Quality and Safety Engineering. He serves on the editorial boards of eight journals in different capacities. He served an external evaluator for many undergraduate and graduate programs.

Dr. Elsayed is a frequent keynote speakers in National and International Conferences and is the recipient of many awards including Golomski Award for the outstanding paper, William Mong Distinguished Lecturers Award, David F. Baker Research Award of the Institute of Industrial
Weihong 'Grace' Guo is an Assistant Professor in the Department of Industrial and Systems Engineering. She earned her B.S. degree in Industrial Engineering from Tsinghua University, China, in 2010 and her Ph.D. in Industrial & Operations Engineering from the University of Michigan, Ann Arbor, in 2015. Dr. Guo's research interests are in the areas of statistical quality control and process monitoring, data mining for manufacturing and healthcare systems modeling and improvement, and quality-oriented design and modeling of complex manufacturing systems. Her current research focuses on data fusion methods in the interface between applied statistics and system control/optimization. She is a member of IIE, INFORMS, and ASME. Dr. Guo is the recipient of the 2014 ISERC Quality Control & Reliability Engineering Best Student Paper Award Finalist, the 2014 International Conference on Frontiers of Design and Manufacturing Sciences Best Paper Award, the Rackham Predoctoral Fellowship from the University of Michigan, and the Wilson Prize for the Best Student Paper in Manufacturing. Her teaching interests include quality engineering, data analytics, and manufacturing systems.

Mohsen A. Jafari is a professor of Industrial & Systems Engineering at Rutgers University. He has directed or co-directed a total of over $15.5M funding from various government agencies and industry, in areas of automation, system optimization, data modeling, information systems, and risk analysis. His research application areas include energy systems, manufacturing, transportation, and healthcare. His work has led to major technological advances and product development including, multi-material deposition in solid free form fabrication; decision support system for traffic safety (Plan4Safety); integrated closed loop approach to planning, operation and investment of energy systems; cyber risk assessment of power networks; building energy asset management (BEAM); and Berth Planning. He actively collaborates with universities and research institutes in the US and abroad. He has advised thirteen Ph.D. theses and nine post doctoral & research fellows. Presently, he is advising additional ten Ph.D. theses focusing on energy systems, zero-net communities, risk analysis and process improvement in healthcare. He is a member of IEEE and was recipient of the IEEE excellence award in service and research. He has been consultant to several fortune 500 companies, and national and international government agencies.

Dr. Myong K. (MK) Jeong is an Associate Professor and Undergraduate Director in the Department of Industrial and Systems Engineering and the Rutgers Center for Operations Research at Rutgers University. He received his MS in Statistics from Georgia Institute of Technology, Atlanta, Georgia, in 2002, and Ph.D. in Industrial and Systems Engineering from Georgia Institute of Technology, Atlanta, Georgia, in 2004. He was formerly an Assistant Professor in the Department of Industrial and Information Engineering, the University of Tennessee, Knoxville. He worked as a senior researcher from 1993 to 1999 at the Electronics and Telecommunications Research Institute (ETRI). His research interests include data mining, health monitoring, quality and reliability engineering, stochastic processes, and sensor data analysis. He received the Freund International Scholarship and the National Science Foundation (NSF) CAREER Award in 2002 and in 2007, respectively. His research has been funded by the NSF, United States Department of Agriculture (USDA), National Transportation Research Center, Inc. (NTRCI), and industry. He has been a consultant for Samsung Electronics, ETRI, and other companies. He is an associate editor of the IEEE Transactions on Automation Science and Engineering and International Journal of Quality, Statistics and Reliability, and Advisory Board Member of International Journal of Advanced Manufacturing Technology. He is a senior member of IEEE.

Assistant Professor Kang Li received his Bachelor of Science degree in Mechanical Engineering (Precision Instruments and Mechanology) from Tsinghua University, China, in 1999, and completed a Master of Science in Industrial Engineering from Mississippi State University in 2004. He received his Ph.D. in Mechanical and Industrial engineering from the University of Illinois at Urbana-Champaign in May 2009. His research interests are in the areas of Human Factors/Ergonomics, Occupational Biomechanics, Human-Centered Computing, Orthopaedic Biomechanics, Medical Imaging, Computer-integrated Surgery, Rehabilitation Engineering, Physical Therapy, Assistive Device, Prosthetics, Biomedical Manufacturing, and Healthcare System Engineering. He has been
actively working with surgeons, medical students, residents, and fellows in the healthcare field for more than 7 years. He is currently an adjunct assistant professor of the Department of Orthopaedics at Rutgers New Jersey Medical School and a graduate faculty member of Departments of Biomedical Engineering and Computer Science at Rutgers University. His work has been funded by NSF, NIH, NASA-New Jersey Space Grant Consortium, Charles and Johanna Busch Memorial Fund, Rutgers Faculty Research Grant, University Research Council Grant, and New Jersey Health Foundation. He is a finalist for the New Investigator Recognition Award (NIRA) by the Orthopaedic Research Society (2011) and a co-recipient of the 2011 O’Donoghue Sports Injury Research Award. He is a member of IIE, HFES, ISB, and ORS.

James T. Luxhoj is Professor of Industrial and Systems Engineering. Dr. Luxhoj received his Ph.D. in Industrial Engineering and Operations Research from Virginia Polytechnic Institute and State University in 1986. He was an ASEE/Office of Naval Research Distinguished Faculty Fellow at the U.S. Navy Air Systems Command at Patuxent River, MD and Lakehurst, NJ during the summers of 2012 and 2013. He was also an ASEE/NASA Langley Faculty Fellow during the summer of 1987. Dr. Luxhoj was a Visiting Professor at Aalborg University in Denmark from 1994-1995 and Fall 2001. His research interests include risk analysis, system safety and engineering economics. The Federal Aviation Administration, NASA and the U.S. Navy have supported Dr. Luxhoj’s research in aviation safety risk analysis. He is a past Chairman and Director of the engineering economy divisions of the American Society for Engineering Education and the Institute of Industrial Engineers. Dr. Luxhoj was the recipient of a SAE Ralph R. Teetor Award for Engineering Education Excellence (1989), a Sigma Chi Outstanding Professor for Rutgers University Award (1991), the Rutgers University Parents’ Association Teacher of the Year Awards for the College of Engineering (1988,1997), and a six-time recipient of the Rutgers Engineering Governing Council’s Excellence in Teaching Awards. An IIE Fellow, he currently serves as the IIE Faculty Advisor. Dr. Luxhoj is a former Department Editor for the IIE Transactions on Operations Engineering. He is a member of IIE, Tau Beta Pi, Alpha Pi Mu, and Sigma Xi and is the co-author of Engineering Economy, 13th ed. (Prentice-Hall, 2006).

Tuğrul Özel is Associate Professor and Director of Manufacturing & Automation Research Laboratory in the Department of Industrial and Systems Engineering at Rutgers. He received his Ph.D. degree in Mechanical Engineering from Ohio State University in 1998. His research interest includes sustainable and advanced manufacturing, computational modeling and optimization of manufacturing processes, physics-based process simulations, mechatronics, automation and control, micro/nano manufacturing systems. His research has been well funded by National Science Foundation, NASA/New Jersey Space Grant Consortium, Rutgers Research Council and automotive, aerospace, machine tool, and medical device industry. He is the Editor-in-Chief of the International Journal of Mechatronics and Manufacturing Systems and has been serving as editorial board member for several international journals including International Journal of Machine Tools and Manufacture, and Production Engineering. He is the co-author of four edited books “Intelligent Machining”, (ISTE-Wiley, 2009), “Micro-Manufacturing: Design and Manufacturing of Micro-Products”, (Wiley, 2010); “Modern Manufacturing Processes”, (Wiley forthcoming in 2014); and “Biomedical Devices: Design, Prototyping, and Manufacturing”, (Wiley, forthcoming in 2014). He has published over 50 articles in engineering journals and authored nearly 50 conference publications. He has been organizer and member of scientific or program committee over 30 international conferences. Dr. Özel is active senior member of SME, ASME, North American Manufacturing Research Institute and associate member of CIRP- International Academy for Production Engineering. He is listed in The Marquis Who’s Who in the World, Who’s Who in America, and Who’s Who in Science and Engineering.

Hoang Pham is Professor in the Department of Industrial and Systems Engineering at Rutgers University. Before joining Rutgers, he was a Senior Engineering Specialist with the Idaho National Engineering Laboratory and Boeing Company. Dr. Pham received his Ph.D. from the State University of New York at Buffalo. His research areas include system reliability modeling, maintenance, and software reliability. Dr. Pham is the Editor-in-Chief of the International Journal of Reliability, Quality and Safety Engineering and an associate editor of several journals. He is also the Editor of Springer Series in Reliability Engineering, Editor of World Scientific Series on Industrial and Systems Engineering, and an editorial board member of several journals. Dr. Pham is the author/coauthor of 5 books, edited 9 books and has published 125 journal articles. He is a Fellow of IEEE and IIE.
Dr. Honggang Wang is an Assistant Professor in Industrial and Systems Engineering at Rutgers University. He received his Bachelor of Science degree in Power Engineering from Shanghai Jiao Tong University, Shanghai, China, in 1996, Master of Science in Manufacturing Engineering from University of Missouri-Rolla, in 2004, and Ph.D. in Industrial Engineering from Purdue University, Indiana, in 2009. He has worked as a Postdoctoral Scholar in Energy Resources Engineering at Stanford University for two years before he joined the department of Industrial and Systems Engineering at Rutgers in 2011. Dr. Wang’s research and teaching interests lie in system uncertainty modeling and analysis, stochastic optimization, operations research, and their applications in energy production, supply chains, and manufacturing systems. Dr. Wang has won IBM faculty award 2012. His research has been supported by Rutgers Research Council and IBM.

11. FACULTY ADVISORS

<table>
<thead>
<tr>
<th>CLASS</th>
<th>ADVISOR</th>
<th>E-MAIL ADDRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>Dr. J. Luxhoj</td>
<td><a href="mailto:jluxhoj@rci.rutgers.edu">jluxhoj@rci.rutgers.edu</a></td>
</tr>
<tr>
<td>2018</td>
<td>Dr. K. Li</td>
<td><a href="mailto:kl419@rci.rutgers.edu">kl419@rci.rutgers.edu</a></td>
</tr>
<tr>
<td>2017</td>
<td>Dr. H. Pham</td>
<td><a href="mailto:hopham@rci.rutgers.edu">hopham@rci.rutgers.edu</a></td>
</tr>
<tr>
<td>2016</td>
<td>Dr. H. Wang</td>
<td><a href="mailto:hw260@rci.rutgers.edu">hw260@rci.rutgers.edu</a></td>
</tr>
</tbody>
</table>

12. DEPARTMENTAL FACILITIES

Manufacturing Automation Laboratory: This laboratory is equipped with state-of-the-art equipment in CAD/CAM (Computer Aided Design and Computer Aided Manufacturing) and manufacturing automation systems. It includes production type CNC milling machines, a CNC lathe equipped with force dynamometers and an acoustic emission sensor, a mini-CNC laser-micro machining station, an innovative sheet folding machine, an impact testing machine, an automated storage and retrieval system, a material handling carousel and a robot assembly work station.

Manufacturing Processes Laboratory: Basic machine tools such as turning, milling, drilling, grinding, welding and measuring machines are available to help the student become familiar with metal-processing operations. The equipment is also used to perform laboratory experiments in heat treatment, tool life and chip formation assessments.

Microcomputer Laboratory: This lab is equipped with state-of-the-art PCs. The lab has the latest simulation software such as ARENA, Matlab/Simulink, and optimization software LINDO, GINO, etc. It has software for Quality Control, Plant Layout, Production Control, Statistical Analysis and text processing. It also has CAD/CAM/CAE software including AutoCAD, SolidWorks, ABAQUS and FeatureCAM. The laboratory is connected to a university-wide network and the Internet.

Quality and Reliability Engineering Laboratory: This lab has been developed to allow the students to have hands on experience in actual methods for quality control and reliability engineering. A variety of software for control charts, sampling plans and design of experiments is available. The laboratory has a wide array of metrology equipment such as digital calipers and micrometers, roundness measurement equipment, surface profilometers and a coordinate measuring machine. It also has various materials testing equipment, a Rockwell hardness tester temperature chambers, vibration test stands, and failure analysis equipment such as voltage stressing equipment, and measuring microscopes. LABVIEW, Minitab and STATGRAPHICS software are available for students use.
13. GENERAL INFORMATION

IMPORTANT OFFICES:

School of Engineering

Dean Thomas Farris, Dean, School of Engineering, Room B204, Engineering Building, 445-2214

Dean Peng Song, Associate Dean for Academic Affairs, Room B100, Engineering Building, 445-2212

Dean Ilene Rosen, Assistant Dean for Special Programs, Room B110, Engineering Building, 445-2687

Dean Lydia Prendergast, Assistant Dean for First Year Students, Room B100, Engineering Building, 445-2212

The Undergraduate Registrar - Room 200F, Administrative Service Building, Davidson Road, Busch Campus, 445-3557

Career Services - 56 College Avenue, College Avenue Campus, 932-7997

Financial Aid Room - 140 Records Hall, College Avenue Campus, 932-7057

Housing - On-Campus - Taylor Road, Busch Campus General Information, 445-2992; Off-Campus - 445-7766

International Student Center - 180 College Avenue, College Avenue Campus, Counselor to International Students - 932-7015

Student Accounting Records Hall, College Avenue Campus, Room 138, 932-7581

Undergraduate Course Periods: Undergraduate courses mostly meet during the day. The time periods are as follows:

<table>
<thead>
<tr>
<th>Period</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tr>
<td>Starts</td>
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<td>AM</td>
<td>10:20</td>
<td>AM</td>
<td>12:00</td>
<td>AM</td>
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<td>AM</td>
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<tr>
<td>Ends</td>
<td>10:00</td>
<td>11:40</td>
<td>1:20</td>
<td>3:00</td>
<td>4:40</td>
<td>6:20</td>
<td>8:00</td>
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</table>

Class Periods - Start and End Times
14. ADDITIONAL INFORMATION

**Departmental Office:** The Department of Industrial and Systems Engineering office is located on the second floor of the CORE Building (Room 201). The office has copies of most forms you might need and the staff working there can answer many questions. Office hours are 8:30-4:30 PM, Monday through Friday. Closed for lunch between 12:00 - 1:00 PM.

**Electronic Mail:** All Rutgers students may obtain a computer account on the Eden machine in order to send and receive electronic mail. Go to the Micrographic Center in the basement of the Hill Center, Room 17, and the counselor there will show you how to create your account. The phone number is (848) 445-2296 and they are open 10-6 PM Monday through Saturday.

**Employment Opportunities:** Job announcements are posted on the ISE bulletin boards. Students are encouraged to make use of the Career Development and Placement Office on Busch campus.

**Bulletin Boards:** In the hallways on the 1st and 2nd floors, there are bulletin boards, which list course changes, seminars, fellowships, and other miscellaneous notices.

**The Telephone Number** for the Department of Industrial and Systems Engineering is (848) 445-3654 and the fax number is (848) 445-5467. The area code and prefix is (848) 445 for all telephones - the extensions are given below.

<table>
<thead>
<tr>
<th>NAME</th>
<th>EXT</th>
<th>CORE</th>
<th>EMAIL</th>
</tr>
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<tbody>
<tr>
<td>Albin, Susan</td>
<td>2238</td>
<td>206</td>
<td><a href="mailto:salbin@rci.rutgers.edu">salbin@rci.rutgers.edu</a></td>
</tr>
<tr>
<td>Boucher, Thomas O.</td>
<td>3657</td>
<td>224</td>
<td><a href="mailto:tboucher@rci.rutgers.edu">tboucher@rci.rutgers.edu</a></td>
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<tr>
<td>Coit, David</td>
<td>2033</td>
<td>214</td>
<td><a href="mailto:coit@rci.rutgers.edu">coit@rci.rutgers.edu</a></td>
</tr>
<tr>
<td>Elsayed, Elsayed A.</td>
<td>3859</td>
<td>226</td>
<td><a href="mailto:elsayed@rci.rutgers.edu">elsayed@rci.rutgers.edu</a></td>
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<tr>
<td>Guo, Weihong</td>
<td>8556</td>
<td>220</td>
<td><a href="mailto:wg152@scarletmail.rutgers.edu">wg152@scarletmail.rutgers.edu</a></td>
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<tr>
<td>Gursoy, Melike B.</td>
<td>5465</td>
<td>218</td>
<td><a href="mailto:gursoy@rci.rutgers.edu">gursoy@rci.rutgers.edu</a></td>
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<tr>
<td>Jafari, Mohsen A.</td>
<td>3627</td>
<td>201</td>
<td><a href="mailto:jafari@rci.rutgers.edu">jafari@rci.rutgers.edu</a></td>
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<tr>
<td>Jeong, Myong K.</td>
<td>4858</td>
<td>204</td>
<td><a href="mailto:mjeong@rci.rutgers.edu">mjeong@rci.rutgers.edu</a></td>
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<tr>
<td>Li, Kang</td>
<td>8787</td>
<td>228</td>
<td><a href="mailto:kl419@rci.rutgers.edu">kl419@rci.rutgers.edu</a></td>
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<tr>
<td>Luxhoj, James T.</td>
<td>3625</td>
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<td><a href="mailto:jluxhoj@rci.rutgers.edu">jluxhoj@rci.rutgers.edu</a></td>
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<tr>
<td>Ozel, Tugrul</td>
<td>1099</td>
<td>208</td>
<td><a href="mailto:ozel@rci.rutgers.edu">ozel@rci.rutgers.edu</a></td>
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<td>Pham, Hoang</td>
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<td>Doig, William</td>
<td>8502</td>
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<td><a href="mailto:wdoig@rci.rutgers.edu">wdoig@rci.rutgers.edu</a></td>
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<tr>
<td>Ielmini, Cindy</td>
<td>8506/3654</td>
<td>201</td>
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<td>Lippencott, Joseph</td>
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<td><a href="mailto:lippen@rci.rutgers.edu">lippen@rci.rutgers.edu</a></td>
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<tr>
<td>Smith-Perrillo, Helen</td>
<td>8507/3654</td>
<td>204</td>
<td><a href="mailto:helen@rci.rutgers.edu">helen@rci.rutgers.edu</a></td>
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<tr>
<td>Manufacturing Automation Lab</td>
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<tr>
<td>MicroComputer Lab</td>
<td>3671</td>
<td>106</td>
</tr>
<tr>
<td>Quality &amp; ReliabilityLab</td>
<td>5480</td>
<td>114</td>
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<tr>
<td>Manufacturing Processes Lab</td>
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<tr>
<td>Conference Room</td>
<td>8555</td>
<td>203</td>
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</table>
15. SECURITY AND SAFETY

Providing a secure and safe environment for all is a top priority.

**Emergency Phone Number**: The number is 932-7111 for university police and emergency.

**CORE Building Access**: The door is open weekdays from 8 AM to 6 PM.

**Access to First Floor IE Corridor**: The door is open weekdays from 9-12 and 1-4:30 PM. For your safety, the corridor is under camera surveillance.

**Access to Labs**: The labs are open from 8:30 AM to 4:30 PM.

**DON'T LET STRANGERS IN**: Don't open the door for people who have no entry keys. Don't keep any door ajar by placing an object in front of it.

**Laboratory Rules**:

- No food or beverages.
- Know the hazards of the material and equipment you are using.
- Use goggles in manufacturing laboratories.

Obtain permission of the lab director to use power.

Last Update September 8, 2015