Industrial & Systems Engineering

Undergraduate Student Handbook & Curriculum Requirements

Curriculum Effective
Spring 2013
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Important Contact Information

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*See list of ISyE faculty profiles on pages 33-36*

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3182 Mechanical Engineering Building
(Please contact me for any questions you may have about your ISyE program and more!)

Graduate Student Coordinator  890-2248
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3246 Mechanical Engineering

College of Engineering

Manuela Romero
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2620 Engineering Hall

Bonnie Schmidt
Transfer Admissions Coordinator  schmidt@engr.wisc.edu  262-4822
(SOAR, transfer of credits from other universities, including those abroad)
1150 Engineering Hall

Important Web Addresses:

My UW Homepage:  http://my.wisc.edu/portal/index.jsp

ISyE Department Home Page:  http://www.engr.wisc.edu/ie

(EAGLES) ISyE Online Course Planning System:  https://admin.engr.wisc.edu/course_planner/index.php/

Schedule of Classes Timetable:  http://registrar.wisc.edu/schedule_of_classes.htm/

MyUW Class Waitlist System for courses – please see MyUW student center course information for wait list information;
http://registrar.wisc.edu/isis_helpdocs/enrollment_demos/V90WaitList/V90WaitList.htm
Department of Industrial and Systems Engineering

Mission

Create, acquire, assimilate, apply, and transfer knowledge for the design, analysis, improvement and implementation of complex systems that include humans, materials and equipment and other resources - the essence of Industrial and Systems Engineering.

Vision

To be a Top-Five ranked Industrial and Systems Engineering Department recognized for our:

- Innovative educational curricula and learning experiences
- Strong, balanced research program
- Positive and diverse learning environment
- Beneficial outreach/technology transfer activities
- Leadership in the ISyE profession

Guiding Principles

- Support and reward excellence and innovation
- Create competencies for life-long learning
- Foster environments for teamwork and diversity
- Create partnerships with industry, government, and alumni
- Act with professional and ethical responsibility
- Foster good University “Citizenship”
- Advance the reputation of the ISyE profession, the ISyE Department, and the University
ISyE Educational Objectives

1. Provide students with a thorough understanding and working knowledge of mathematics, physical science, economics, and basic engineering principles to solve industrial engineering problems. Consistent with College objective on **engineering fundamentals**.

2. Through classroom and experiential training, provide students with the knowledge and capabilities to use appropriate techniques, skills, and tools to identify, formulate, analyze, and solve industrial engineering problems. Consistent with College objective on **engineering fundamentals**.

3. Through classroom and experiential training, provide students with the knowledge, capabilities, and skills necessary to design a system, component, or process to meet an identified need. Consistent with College objective on **'real-world' engineering practice**.

4. Provide students with an awareness to recognize the need for life-long learning and prepare them with good research skills to gain new knowledge or information necessary. Consistent with College objective on **'real-world' engineering practice**.

5. Provide students with project work and group process experiences to help develop skills in communicating and working effectively on teams to solve engineering problems. Consistent with College objective on **teamwork and communication skills**.

6. Provide our students, by thorough guidance and example, with an understanding of how to act with professional and ethical responsibility and appreciate the impact of their solutions in a global/societal context. Consistent with College objective on **leadership, citizenship and professionalism**.
Educational Outcomes

A Graduate from UW-Madison with a BSIE should be able to:

1. Apply knowledge of math, science, economics, and engineering principles to solve industrial and systems engineering, social, or business problems.

2. Use appropriate industrial and systems engineering techniques, skills, and tools to identify, formulate, analyze, and solve industrial and systems engineering, social or business problems.
   - Apply quality planning, control and improvement techniques
   - Use computer tools such as simulation and spreadsheets
   - Know what information is necessary and sufficient to solve ISyE problems
   - Apply project management skills and tools in areas of business case development, estimating, project planning, project control and monitoring, risk assessment, and contingency planning.
   - Use experimental design or data collection and analysis, including statistics
   - Choose, apply, constructively critique, and adapt or extend appropriate ISyE techniques
   - Recognize, describe, predict and analyze systems behavior

3. Design and implement a system, component, or process to meet an identified need.
   - Integrate problem solutions into a proposed action program or plan
   - Select and evaluate off-the-shelf solutions and vendors' proposals
   - Design human tasks for minimal stress and maximum performance
   - Understand physiological and cognitive aspect of humans as components in complex systems
   - Maintain a systems level perspective, yet show an appreciation for product design and operational level issues
   - Identify opportunities for improvement

4. Communicate effectively and work well on teams.
   - Write clearly and grammatically
   - Show proficiency in technical communication, including graphics
   - Justify, communicate, and sell a solution at all levels, both technical and non-technical.
   - Contribute to solve ISyE problems, and cooperate with other engineers to solve other engineering problems

5. Engage in continued learning, and demonstrate an appreciation of the benefits of lifelong learning.
   - Get help and gain new knowledge or information, using information technology or the literature of the profession

6. Act with professional and ethical responsibility, and demonstrate an understanding of contemporary issues and the impact of proposed solutions in a global/societal context.
Industrial and Systems Engineering: What You Can Look Forward To

The first BSIE at the University of Wisconsin-Madison was awarded in 1969. Since that time, an increasing percentage of industry and other organizations have discovered the value of industrial and systems engineers. There is now a large demand for people with diversified backgrounds, not only technical knowledge but also people knowledge.

In the Department of Industrial and Systems Engineering at UW-Madison, the course curriculum is set up to give you this diversified background and at the same time allow you choices according to your individual interests. Course work could be categorized in four main areas:

- Decision Science and Operations Research
- Health Systems Engineering
- Human Factors and Ergonomics
- Manufacturing and Production Systems
- Quality Engineering and Management

Although there is no "major" within ISyE, it is possible to achieve a degree of specialization in one of the above areas through a judicious choice of your electives. Courses focusing on teams and design projects prepare students to succeed in the workplace.

What to focus on and your choice of electives are probably the biggest issues for most ISyEs so we’ve included a guide to help you choose your electives on pages 14 and 15. The chart works deductively, too, in that you can review the individual class descriptions and get an idea of what the work in that focus area would encompass.

Industrial Engineers make things better!

Industrial and systems engineering functions are found throughout the economy in the generation of both goods and services. Improving productivity and quality is a growing concern in today’s economy. Industrial engineers carry out economic analyses, facility designs, cost justifications, and economic feasibility studies. They evaluate ideas and often recommend alternative directions. Computer systems, as aids in decision making or as information storage, also fall in the domain of industrial engineering.

After graduation there are many different job opportunities. Many industrial engineers are employed in some facet of manufacturing. Here they and other engineers are responsible for the production of a product or perhaps a service. They must interface with many types of professionals attempting to blend technology, people, money and information to assure smooth and efficient operations.

Job opportunities outside manufacturing industries abound because there is virtually no limit to what can be done using industrial and systems engineering functions. Industrial engineers work in hospitals and medical centers, telecommunication companies, research laboratories, education systems, airline and transportation companies, banks, and consulting organizations. Management positions are often filled with industrial engineers, both at entry levels and later as career advancements.
# ISyE Required Curriculum (Fall 2008 and beyond)

<table>
<thead>
<tr>
<th>Mathematics</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 221 (or 217 or 275)</td>
<td>Calculus and Analytic Geometry</td>
</tr>
<tr>
<td>Math 222 (or 276)</td>
<td>Calculus and Analytic Geometry</td>
</tr>
<tr>
<td>Math 234</td>
<td>Calculus – Functions of Several Variables</td>
</tr>
<tr>
<td>Stat 311</td>
<td>Introduction to Mathematical Statistics I</td>
</tr>
<tr>
<td>Stat 312</td>
<td>Introduction to Mathematical Statistics II</td>
</tr>
<tr>
<td>Math Elective</td>
<td>See next page for options</td>
</tr>
<tr>
<td>Math/Stat Elective</td>
<td>See next page for options</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>27 credits</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Science</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 201 (or EMA 201(^1))</td>
<td>General Physics</td>
</tr>
<tr>
<td>Physics 202(^1)</td>
<td>General Physics</td>
</tr>
<tr>
<td>Chem 109 (or 103 &amp; 104)</td>
<td>General Chemistry</td>
</tr>
<tr>
<td>Computer Science Elective</td>
<td>See next page for options</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18-21 credits</strong></td>
</tr>
</tbody>
</table>

| Engineering Science Electives | See next page for explanation | **Total** | 6 credits |
| Biology Elective | See next page for option | **Total** | 3 credits |

<table>
<thead>
<tr>
<th>Required ISyE Courses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acct IS 300 (or 100)</td>
<td>Accounting Principles</td>
</tr>
<tr>
<td>ISyE 313</td>
<td>Engineering Economic Analysis</td>
</tr>
<tr>
<td>ISyE 315</td>
<td>Production Planning &amp; Control</td>
</tr>
<tr>
<td>ISyE 320</td>
<td>Simulation and Probabilistic Modeling</td>
</tr>
<tr>
<td>ISyE 321</td>
<td>Simulation Modeling Laboratory</td>
</tr>
<tr>
<td>ISyE 323</td>
<td>Operations Research – Deterministic Modeling</td>
</tr>
<tr>
<td>ISyE 349</td>
<td>Introduction to Human Factors</td>
</tr>
<tr>
<td>ISyE 415</td>
<td>Manufacturing Systems</td>
</tr>
<tr>
<td>ISyE 417</td>
<td>Health Systems Engineering</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25 credits</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technical Electives</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inter-Engr 160</td>
<td>Introduction to Engineering (freshmen only)</td>
</tr>
<tr>
<td>Electives</td>
<td>See page 11 for options</td>
</tr>
<tr>
<td>Junior Design Elective</td>
<td>ISyE 350 Junior Design Lab</td>
</tr>
<tr>
<td>Senior Design Elective</td>
<td>See page 12 for options</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21 credits</strong></td>
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<table>
<thead>
<tr>
<th>Communication Skills</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective</td>
<td>According to CoE regulations</td>
</tr>
<tr>
<td>EPD 397</td>
<td>Technical Communication</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5-6 credits</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liberal Studies</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives</td>
<td>See next page for a detailed explanation.</td>
</tr>
<tr>
<td>Econ 101 (or 111)</td>
<td>Principles of Micro Economics (Econ-Accelerated)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15 credits</strong></td>
</tr>
</tbody>
</table>

**Required Total** | **120 credits**

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1. EMA 201 alone does NOT meet the pre-req for Physics 202. If you take EMA 201 you must take either EMA 202 or ME 240 also to meet the Physics 202 pre-requisites. EMA 202 and ME 240 will fulfill Engr Sci cr requirements.

2. If you take EMA 201 and Chem 109 in addition to Physics 202 and 3 cr of CS, you will be 2 cr short of the min number of Science cr required (18). You would need to take at least 2 additional cr of math or science from the College of Letters and Science.
## Elective Options

### Math  
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 320</td>
<td>Linear Mathematics</td>
<td>3 cr.</td>
</tr>
<tr>
<td>Math 340</td>
<td>Elementary Matrix &amp; Linear Algebra</td>
<td>3 cr.</td>
</tr>
</tbody>
</table>

**NOTE:** Students cannot get degree credit for Math 320 and Math 340.

### Math/Statistics  
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 319</td>
<td>Techniques in Ordinary Differential Equations</td>
<td>3 cr.</td>
</tr>
<tr>
<td>Stat 333</td>
<td>Applied Regression Analysis</td>
<td>3 cr.</td>
</tr>
<tr>
<td>Stat/ME 424</td>
<td>Statistical Experimental Design for Engineers</td>
<td>3 cr.</td>
</tr>
</tbody>
</table>

***PLEASE NOTE: Students cannot get degree credit for Stat/ME 424 and ISyE 575.***

### Science  

**PLEASE NOTE:** If you take EMA 201 and Chem 109 in addition to Physics 202 and 3 cr of CS, you will be 2 cr short of the min number of Science cr required. Since you need to take at least 2 additional cr of math or science from L & S to meet this min cr requirement, you could take an introductory course in botany, biology, or zoology or an additional course in CS, Physics or Chem without adding too many credits to your total. This additional science could be a distinct benefit to the development of your ISyE focus area.

### Computer Science  
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp Sci 302</td>
<td>Algebraic Language Programming</td>
<td>3 cr.</td>
</tr>
<tr>
<td>Comp Sci 310</td>
<td>Problem Solving Using Computers</td>
<td>3 cr.</td>
</tr>
</tbody>
</table>

### Engineering Science Elective  
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMA 202 or ME 240</td>
<td>to meet pre-req for Physics 202 if you took EMA 201</td>
<td>3 cr.</td>
</tr>
</tbody>
</table>

Any engineering science class at the 200 level and above that is not listed as or cross-listed with ISyE, EPD, Inter -Egr or Pro Or is acceptable for Engineering Science credits **with the exception of** classes that teach principles other than engineering science principles, like business or leadership. While business and leadership courses can be excellent and beneficial to your future, they are not approved as Engineering Science electives.

Examples are:
- ECE 601, Topic: Business for Engineers - as of Spring 2003
- Inter-Engr 400, Dean’s Leadership class

### Biology Elective  
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoology 101</td>
<td>Animal Biology</td>
<td>3 cr.</td>
</tr>
<tr>
<td>Zoology 220</td>
<td>Biology and Society</td>
<td>3 cr.</td>
</tr>
<tr>
<td>Zoology 260</td>
<td>Introductory Ecology</td>
<td>3 cr.</td>
</tr>
<tr>
<td>Biology 153</td>
<td>Introductory Biology</td>
<td>3 cr.</td>
</tr>
</tbody>
</table>
Liberal Studies

All ISyE students must fulfill the College of Engineering’s Liberal Studies requirements. These requirements are:

- As a graduation requirement, and to fulfill campus general education guidelines, all engineering undergraduate students must take 15 credits from the College of Engineering, the Institute of Environmental Studies, or the College of Letters and Science, that carry H, S, L, or Z timetable breadth designators.
- These credits must fulfill the following sub-requirements:
  1. A minimum of two courses from the same department or program. At least one of these two courses must be above the elementary level, shown in the timetable to have an I, A, or D† level designator. Foreign language retrocredits fulfill this requirement. Economics 111 (or 101) and any economics course at the I or A levels may be used to satisfy this requirement. Other combinations of courses may also be used.
  2. A minimum of six credits designated as humanities (H, L or Z breadth designator in the timetable), and an additional minimum of three other credits designated as social studies (S or Z). Foreign language courses count as H credit. However, retro credits do not count toward this sub-requirement.
  3. At least three credits in courses designated as Ethnic Studies (small case “e” timetable designator). These credits may help satisfy regulations 1 or 2 as well, but they only count once toward the total of 15 credits required.
  4. Timetable Designators: I—Intermediate; A—Advanced; D—Intermediate or Advanced.
  5. Retro credits are credits awarded by foreign language departments for successful completion of a 200 level or above foreign language course without taking a 100 level course. They do not count toward the total of 15 credits.

Pass-Fail Option Information

http://studentservices.engr.wisc.edu/regulations/13.html

Students may request to have a free elective (non-program and not counting towards their degree program) class graded in the “pass-fail” system any time within the first four weeks of the semester. Degree program MUST be taken for degree credit. Pass-Fail option requests are available through your MyUW student center – no print form hard copy is necessary, the request is submitting electronically for COE students.

Please see Enrollment demo for further information:

http://Registrar.wisc.edu/isis_helpdocs/enrollment demos/V90CourseChangeRequest/V90CourseChangeRequest.htm

Restrictions on the pass-fail option:

1. A student must be in good standing and have accumulated at least 12 credits toward the degree before taking a course pass-fail.
2. A grade of “C” is the minimum acceptable for a “pass” and pass-fail grades are not included in GPA’s. The pass-fail option may be invoked at any time during the first four weeks of a semester.
# Technical Elective Options

<table>
<thead>
<tr>
<th>Human Factors Sociotechnical Methods</th>
<th>Min 3 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISyE 417</td>
<td>Health Systems Engineering</td>
</tr>
<tr>
<td>ISyE/Psych 449</td>
<td>Sociotechnical Systems in Industry</td>
</tr>
<tr>
<td>ISyE 515</td>
<td>Engineering Management</td>
</tr>
<tr>
<td>ISyE/Psych 549</td>
<td>Human Factors Engineering</td>
</tr>
<tr>
<td>ISyE 552</td>
<td>Hum Factors Eng Design &amp; Eval</td>
</tr>
<tr>
<td>ISyE 555</td>
<td>Human Performance and Accident Causation</td>
</tr>
<tr>
<td>ISyE 556</td>
<td>Occupational Safety &amp; Health Engineering</td>
</tr>
<tr>
<td>ISyE 559</td>
<td>Patient Safety &amp; Error Reduction</td>
</tr>
<tr>
<td>ISyE/BME 564</td>
<td>Occupational Ergonomics and Biomechanics</td>
</tr>
<tr>
<td>ISyE 565</td>
<td>Ergonomics in Service</td>
</tr>
<tr>
<td>ISyE 610</td>
<td>Design of Program Evaluation Systems</td>
</tr>
<tr>
<td>ISyE/LIS 617</td>
<td>Health Information Systems</td>
</tr>
<tr>
<td>ISyE 650</td>
<td>Labor-Management Relations for Engineers</td>
</tr>
<tr>
<td>ISyE/Psych 652</td>
<td>Sociotechnical Systems</td>
</tr>
<tr>
<td>ISyE/Psych 653</td>
<td>Organization and Job Design</td>
</tr>
<tr>
<td>ISyE 658/OTM 758</td>
<td>Managing Technological Change in Mfg. Systems</td>
</tr>
<tr>
<td>ISyE/BME 662</td>
<td>Design &amp; Human Disability &amp; Aging</td>
</tr>
<tr>
<td>ISyE 663</td>
<td>Occupational Stress</td>
</tr>
<tr>
<td>ISyE 6916</td>
<td>Special Topics in Industrial Engineering</td>
</tr>
<tr>
<td>ISyE 6925</td>
<td>Special Topics in Human Factors</td>
</tr>
<tr>
<td>ISyE 6997</td>
<td>Advanced Independent Study (pre-approval required)</td>
</tr>
</tbody>
</table>

## Quantitative Methods

<table>
<thead>
<tr>
<th>Min 3 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Info Syst 422/ ISyE 722</td>
</tr>
<tr>
<td>ISyE/CS/Math 425</td>
</tr>
<tr>
<td>ISyE/ NE 460</td>
</tr>
<tr>
<td>ISyE/ME 510</td>
</tr>
<tr>
<td>ISyE/ME 512</td>
</tr>
<tr>
<td>ISyE/ME 513</td>
</tr>
<tr>
<td>ISyE 516</td>
</tr>
<tr>
<td>ISyE 517</td>
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<tr>
<td>ISyE 520</td>
</tr>
<tr>
<td>ISyE/CS/Math/Stat 525</td>
</tr>
<tr>
<td>ISyE 5758</td>
</tr>
<tr>
<td>ISyE/OTM 578</td>
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<tr>
<td>ISyE 605</td>
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<td>ISyE 611</td>
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<td>ISyE/OTM 620</td>
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<tr>
<td>ISyE 624</td>
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<tr>
<td>ISyE 625</td>
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<tr>
<td>ISyE/Math/OTM/Stat 632</td>
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<tr>
<td>ISyE/Math/OTM 633</td>
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<tr>
<td>ISyE/CS 635</td>
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<td>ISyE/ME 641</td>
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<td>ISyE/ME 643</td>
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<td>ISyE 655</td>
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<td>ISyE/OTM 671</td>
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<tr>
<td>ISyE/OTM 672</td>
</tr>
<tr>
<td>ISyE 6916</td>
</tr>
<tr>
<td>ISyE 6997</td>
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## Quality Engineering

<table>
<thead>
<tr>
<th>Min 3 credits</th>
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</thead>
<tbody>
<tr>
<td>ISyE/ME 512</td>
</tr>
<tr>
<td>ISyE 515</td>
</tr>
<tr>
<td>ISyE 5758</td>
</tr>
<tr>
<td>ISyE 6997</td>
</tr>
</tbody>
</table>

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6 Any Special Topic course (691 & 692) or Ind study (699) MUST HAVE PRIOR APPROVAL to be used as a technical elective.  
7 No more than 3 credits may be taken in ISyE 699 in fulfillment of the 21 credit requirement for ISyE technical electives.  
8 Credit will not be given for both ISyE 575 & Statistics 424.
ISyE Design Requirements

Engineering Design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, analysis, and construction, testing, and evaluation.

Freshman Design Requirement — Inter Egr 160 3 credits
Intro to Engineering Design
This course provides the incoming freshman with an overview of engineering based on a ‘hands-on’ experience with a client-centered engineering design project, which includes: 1) a team-based design project, 2) a survey of engineering disciplines, and 3) an introduction to computer tools and lab techniques.

Sophomore Design Requirement — ISyE 315 3 credits
Production Planning & Control
Techniques and applications of control concepts in the design of inventory, production, quality, and project-planning systems; use of the computer as a component in such systems.

Junior Design Lab — ISyE 350 3 credits
Junior level lab will include open-ended problem solving projects or major homework assignments that:
• Develop the student’s creativity and problem solving skills
• Require the formulation of design problem statements, and defined objectives and criteria for system synthesis, analysis, and evaluation
• Develop and use the student’s concept of modern design theory and methodology
• Require the consideration and feasibility of alternative solutions
• Address realistic factors related to economics, safety, aesthetics, ethics, and societal impact
• Integrate and build upon basic sciences and knowledge presented in preceding classes
• Develop teamwork and communication skills
• Focus on designing “processes” to promote the understanding, acceptance, and testing of the solution.

Senior Design Elective Courses 3 credits
Senior level design elective courses involve an open-ended problem solving project with outside organizations that includes all the requirements listed above for Junior level design courses plus a significant student presentation of their project activities and results. Furthermore, the course section sizes will be limited to allow for good interactions between the instructor and the students.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISyE 476</td>
<td>Industrial Engineering Design</td>
<td>3 cr.</td>
</tr>
<tr>
<td>ISyE 515</td>
<td>Engineering Management</td>
<td>3 cr.</td>
</tr>
<tr>
<td>ISyE 552</td>
<td>Human Factors Engineering Design and Evaluation</td>
<td>3 cr.</td>
</tr>
<tr>
<td>ISyE 565</td>
<td>Ergonomics in Service</td>
<td>3 cr.</td>
</tr>
<tr>
<td>ISyE/ME 641</td>
<td>Design and Analysis of Manufacturing Systems</td>
<td>3 cr.</td>
</tr>
<tr>
<td>ISyE/Psych 653</td>
<td>Organization &amp; Job Design</td>
<td>3 cr.</td>
</tr>
<tr>
<td>ISyE/OTM 671</td>
<td>E-Business: Technologies, Strategies and Applications</td>
<td>3 cr.</td>
</tr>
<tr>
<td>ISyE/OTM 672</td>
<td>E-Business Transformation: Design, Analysis and Justification</td>
<td>3 cr.</td>
</tr>
</tbody>
</table>
Industrial and Systems Engr
Effective for Students Entering ISyE Fall 2008 and Later

ISyE Fall 2006 and later

EJ
- Econ 111 Principles of Economics OR Econ 101 Principles
- EPD 275 Technical Presentations
- Math 221 Calculus
- Math 222 Calculus
- Physics 201 General Physics OR EMA 201 Statics
- EMA 232 Dynamics
- ME 240 Dynamics
- Lib Studies
- Chem 103 General Chemistry
- Lib Studies
- Accounting Principles
- Tech Sec (Open)
- Tech Sec (Quality Engr)

JF
- ISyE 315 Production Planning
- ISyE 415 Intra Manu Systems
- Math 234 Calculus
- Slat 311 Intro to Math Stats
- Slat 312 Intro to Math Stats II
- Math 320 Univar Math
- IVarix & Linear Alg
- ISyE 323 Operations Research
- ISyE 349 Intra Human Factors
- ISyE 320 Simulation Modeling
- ISyE 417 Health Systems
- EngrSci Elective
- EngrSci Elective
- Tech Sr Design
- Tech JR Design
- Tech Elec (Human Factors)
- Tech Sec (Open)
- ISyE 103 General Chemistry
- Lib Studies
- Lib Studies
- Lib Studies

GB
- 16-19
- 16
- 16
- 16
- 15
- 15
### Example: ISyE Curriculum 2012

**With Physics 201**

Total Credits to Graduate: 120-122

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td><strong>Course</strong></td>
<td><strong>Credits</strong></td>
</tr>
<tr>
<td>Math 221 (or 217 or 275)</td>
<td>5</td>
</tr>
<tr>
<td>Chem 109</td>
<td>5</td>
</tr>
<tr>
<td>InterEngr 160 *</td>
<td>3</td>
</tr>
<tr>
<td>Gen Ed Comm. Elective</td>
<td>2-3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15-16</strong></td>
</tr>
</tbody>
</table>

* Students not taking InterEngr 160 are required to take and additional ISyE Technical Elective

### Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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<tbody>
<tr>
<td><strong>Course</strong></td>
<td><strong>Credits</strong></td>
</tr>
<tr>
<td>Math 234</td>
<td>3</td>
</tr>
<tr>
<td>Phys 202</td>
<td>5</td>
</tr>
<tr>
<td>Stat 311</td>
<td>4</td>
</tr>
<tr>
<td>Comp Sci Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
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</table>

### Junior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course</strong></td>
<td><strong>Credits</strong></td>
</tr>
<tr>
<td>ISyE 323</td>
<td>3</td>
</tr>
<tr>
<td>ISyE 349</td>
<td>3</td>
</tr>
<tr>
<td>Acct IS 100/300</td>
<td>3</td>
</tr>
<tr>
<td>Math/Stat Elective</td>
<td>3</td>
</tr>
<tr>
<td>Liberal Studies Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
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</table>

### Senior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course</strong></td>
<td><strong>Credits</strong></td>
</tr>
<tr>
<td>ISyE 415</td>
<td>3</td>
</tr>
<tr>
<td>ISyE Technical Elective (HF)</td>
<td>3</td>
</tr>
<tr>
<td>ISyE 417</td>
<td>3</td>
</tr>
<tr>
<td>Liberal Studies Elective</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Science Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>
**Example: ISyE Curriculum 2012**
**With EMA 201**
Total Credits to Graduate: 122-124

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course</td>
<td>Credits</td>
<td>Course</td>
</tr>
<tr>
<td>Math 221 (or 217 or 275)</td>
<td>5</td>
<td>Math 222 (or 276)</td>
</tr>
<tr>
<td>Chem 109</td>
<td>5</td>
<td>EMA 201</td>
</tr>
<tr>
<td>InterEngr 160 *</td>
<td>3</td>
<td>Econ 111 (or 101)</td>
</tr>
<tr>
<td>Gen Ed Comm. Elective</td>
<td>2-3</td>
<td>Liberal Studies Elective</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15-16</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

* Students not taking InterEngr 160 are required to take and additional ISyE Technical Elective

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course</td>
<td>Credits</td>
<td>Course</td>
</tr>
<tr>
<td>Math 234</td>
<td>3</td>
<td>Stat 312</td>
</tr>
<tr>
<td>EMA 202 or ME 240</td>
<td>3</td>
<td>ISyE 313</td>
</tr>
<tr>
<td>Stat 311</td>
<td>4</td>
<td>ISyE 315</td>
</tr>
<tr>
<td>Comp Sci Elective</td>
<td>3</td>
<td>Physics 202</td>
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<tr>
<td>Liberal Studies Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
<td><strong>Total</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
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<th>Second Semester</th>
</tr>
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<tbody>
<tr>
<td>Course</td>
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<td>Course</td>
</tr>
<tr>
<td>ISyE 323</td>
<td>3</td>
<td>ISyE 320</td>
</tr>
<tr>
<td>ISyE 349</td>
<td>3</td>
<td>ISyE 321</td>
</tr>
<tr>
<td>Acct IS 100/300</td>
<td>3</td>
<td>ISyE 350 Jr Design Lab</td>
</tr>
<tr>
<td>Math/Stat Elective</td>
<td>3</td>
<td>EPD 397</td>
</tr>
<tr>
<td><strong>Biology Elective</strong></td>
<td><strong>3</strong></td>
<td>Math Elective</td>
</tr>
<tr>
<td><strong>ISyE Tech Elect (QE)</strong></td>
<td><strong>3</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th>First Semester</th>
<th>Second Semester</th>
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<td>Credits</td>
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<td>Senior Design Elective</td>
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<td>3</td>
<td>ISyE Technical Elective (Quan)</td>
</tr>
<tr>
<td>ISyE 417</td>
<td>3</td>
<td>ISyE Technical Elective (Open)</td>
</tr>
<tr>
<td>Liberal Studies Elective</td>
<td>3</td>
<td>Liberal Studies Elective</td>
</tr>
<tr>
<td>Engineering Science Elective</td>
<td>3</td>
<td>Engineering Science Elective</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>
ISyE Undergraduate General Information

ISyE UNDERGRADUATE ADVISING

The College of Engineering (COE) encourages students to seek guidance from multiple sources throughout their undergraduate studies. Just as no one mentor can fulfill all of a developing professional’s needs, no one advisor can fulfill all of a student’s needs. A student will receive richer and more valuable advice by seeking that advice from multiple advisors.

Role of the Student in the Advising Process

The COE requires, and expects, students to be active in educational planning and advisement. Students are expected to know what their degree requirements are; to monitor their academic progress, which includes knowing what courses have been completed, what courses remain, and what good academic standing means; to be aware of policies and procedures which guide their studies; to consult regularly with an advisor, especially before every registration period; and to be aware of how he/she learns in order to balance course schedules. The ISyE department will hold required an ISyE Advising Day during the fall and spring semesters to assist with this process. Students studying abroad, on co-op or who are on unable to attend the Advising Day, must check in with either their faculty or academic advisor prior to their enrollment time.

Faculty & Academic Advisors

All undergraduate students who have been admitted into the ISyE department will be assigned both a faculty advisor and an academic advisor to assist them throughout their ISyE program.

All students are strongly encouraged to take the initiative to build a mentoring relationship with their faculty advisor as well as with other faculty members. Building a mentoring relationship with faculty is best done by meeting in person with faculty for scholarly advice such as guidance on research/independent study projects and advice on post-graduation plans.

Faculty advisors are the best advisors to see for questions about course content, questions about course intensity and for help selecting advanced coursework or advanced electives to align with your post-graduation plans.

The academic advisor advises students on curriculum requirements; COE and UW-Madison policies and procedures; and the graduate school or professional school application process. An academic advisor can work with students to develop individual educational plans, answer questions about DARS reports, and connect students with other campus resources (e.g., Office of Student Financial Services, Engineering Transfer Admissions, International Engineering Studies and Programs, Engineering Career Services, etc.).

The best way to meet with an academic advisor is in the North Student Services Center – NSSC (serving BME / ISyE /ME students) in room 3182 ME. Students can make an individual appointment by using the Online Scheduling Tool (https://tools.wisccal.wisc.edu/available/) for Pam Peterson or email her at prpeters@engr.wisc.edu for further information.
Degree Audit Reporting System (DARS)

The Degree Audit Reporting System (DARS) is part of UW–Madison’s commitment to academic advising for undergraduate students. An automated summary of a student's academic progress toward a degree, a DARS report, is particularly helpful when combined with the personal wisdom and insight of skilled advisors. DARS reports should always be reviewed with transcripts.

Most students may order a DARS report on the Web through My UW–Madison at my.wisc.edu on the Student Records tab. DARS shows which requirements have already been completed and which remain unsatisfied. DARS is not intended to replace students’ contact with academic and faculty advisors. Instead, the quick and thorough analysis provided by DARS allows more time in an advising appointment to discuss course options, research opportunities, plans for graduate school, or issues of personal interest or concern to students.

Please remember that DARS is just a computer program and it may occasionally make mistakes or place courses in a non-optimal fashion. If you see something on your DARS report that does not seem right, or does not make sense, please contact an advisor and we can help you sort it out.

UW Course Guide
http://public.my.wisc.edu/portal/render.userLayoutRootNode.uP

The Course Guide provides a broad spectrum of course information in a consistent format and in a single location. It is an enriched, searchable course catalog with aggregated information from many campus sources. The Course Guide is available for use by students, faculty and instructional staff, departments, advisors, and staff. In addition, it is available to prospective students and their parents along with anyone interested in UW-Madison course information.

For students, faculty and instructors, advisors, and UW-Madison staff (i.e., those with a UW-Madison NetID), log onto MyUW at http://my.wisc.edu/ and click on the Course Guide tab. Prospective students, parents, high school counselors or anyone without a UW-Madison NetID should access the Course Guide at http://public.my.wisc.edu/

Scholarships
http://scholarships.wisc.edu/Scholarships/

In recent years the Department has been able to offer each Fall Semester several (15-25) scholarships to ISyE students for the following academic year. The scholarships are of moderate value ($1000-$3000) and are awarded to students with excellent academic records. Students with solid academic records are encouraged to apply. Applications are accepted through the end of April and are available online at http://www.engr.wisc.edu/ie/current/undergrad/scholarships.html

Substitution Procedure

Any time you want to deviate from the published elective lists (i.e., the ones on page 11), students must fill out a course substitution form, available in the North Student Services Office in 3182 ME or at http://www.engr.wisc.edu/ie/current/undergrad/subugform.pdf. Please fill out the substitution request using your ISyE dept. information, get your advisor’s approval, and submit the form to the Student Services Office (3182 ME). You should submit the substitution request before you register for the course.
TUTORING & ACADEMIC ASSISTANCE
http://studentservices.engr.wisc.edu/classes/tutoring/

Free academic support if available to engineering students through tutoring, study groups, and supplemental instruction.

CEO Student Support Services
http://www.education.wisc.edu/ceo/services.aspx

The Center for Educational Opportunity (CeO) houses the federally-funded TRIO Student Support Services program. Student Support Services (SSS) provides many services similar to the CeO center including: academic advising, assistance with accessing campus services including financial aid, mentoring, tutoring, opportunities to participate in social/cultural activities, career/graduate school advising, and much more. Students interested in becoming an SSS participant must complete an application for the CeO center.

Chemistry Learning Center
http://www.chem.wisc.edu/areas/clc/signup.htm

The mission of the Chemistry Learning Center is to assist students who are enrolled in general and organic chemistry courses in becoming successful and independent learners. Participation is voluntary and there is no fee. They offer a supportive learning environment where students meet in small groups with staff to work out effective strategies for mastering the chemical content. They have resources for students in some lectures of General Chemistry 103 and 104, and some lecture sections of Organic Chem 343 and 345. Please note that not all courses nor lecture sections in a course are covered at all times.

Counseling Service, College of Engineering
http://studentservices.engr.wisc.edu/counseling/

The College of Engineering’s Counseling Service is available because it’s easier to concentrate on your studies if you can deal effectively with personal, academic and career concerns. Talking with someone who is objective and empathetic can help you sort through these concerns. Appointments can be made with the College of Engineering Counselor, David Lacocque, by telephoning him at 608/265-5600 or by stopping by the office at 333 East Campus Mall (7th Floor). Confidentiality is assured within applicable legal and ethical guidelines. Nothing will be recorded in your academic file.

Diversity Affairs Office (DAO)
http://studentservices.engr.wisc.edu/diversity/

The Diversity Affairs Office (DAO) provides guidance and support to underrepresented students and women in the College of Engineering. DAO also sponsors the Tutor by Request program for all new transfer students and underrepresented students in engineering.
Drop-In Tutoring
http://studentservices.engr.wisc.edu/classes/tutoring/index.html#Wendt

Bring along your friends, study at tables, finish homework, and prepare for exams. Look for the red table signs. Feel free to study at the tables and consult the tutors as needed. Drop-in tutoring is free and open to all.
Sponsored by Engineering Student Services

Contact Person: Jia-Ling Lin
Hours: 6:30-9:00 pm (check web for current schedule)
Location: Wendt Library, 4th floor

Mathematics Tutorial Program
http://www.math.wisc.edu/~tprogram/

The Mathematics Tutorial Program offers free tutoring in a cooperative learning environment for students enrolled in Math 95, 101, 112, 113, 114, 211, 213, 231, 222, 171/217, and 234.

McBurney Disability Resource Center
http://www.mcburney.wisc.edu/

Students who have a documented disability, or suspect that they may have an undiagnosed disability are encouraged to contact the McBurney Disability Resource Center to inquire about obtaining academic accommodations. The McBurney Center provides academic accommodations such as: adaptive/assistive technology access, assistive listening devices, document conversion, elevator keys, ASL interpreting, notetaking support, testing accommodations, and reduced credit load recommendations to name a few. Students must provide documentation and be registered with the McBurney Center to receive at Verified Individualized Services & Accommodations (VISA) before they can obtain accommodations.

Telephone: (608) 263-2741
TTY: (608) 263-6393
Hours: Mon-Fri: 8:00-4:30
Location: 1305 Linden Drive (1st floor)

Supplemental Instruction (SI)/InterEGR 150
http://studentservices.engr.wisc.edu/classes/tutoring/supplemental.html

The Supplemental Instruction (SI) Program is an academic support program for “gateway” courses (EMA 201, EMA 202, ME 240, Physics 201 and Physics 202). SI helps to reinforce concepts, bridge gaps between teaching and learning, and supply strategies to promote problem solving skills with understanding. Students interested in SI are asked to commit time to two 60-minute group discussions facilitated by upper class CoE students. Students enroll in InterEGR 150, which is a zero credit course.

Location: Engineering Hall Atrium/Café area
Hours: Vary by semester 20
Tutor by Request (one-on-one help)
https://studentservices.engr.wisc.edu/classes/tutoring/request/

New transfer students in their first two semesters at UW-Madison and underrepresented students in engineering may be qualified for one-to-one tutoring, if an engineering tutor is available. If you qualify, you are likely to be preauthorized to enroll by visiting the Website listed above. If you believe you qualify and you are not preauthorized to enroll, please contact Dr. Jia-Ling Lin jllin@wisc.edu (608) 262-2473

Writing Center
http://writing.wisc.edu/

The UW Writing Center provides free of charge face-to-face and online consultations which focus on a number of different writing scenarios (i.e. drafts of course papers, resumes, reports, application essays, cover letters, theses, etc). Writing Center instructors will not edit or proofread papers. Instead, their goal is to teach students to edit and proofread in order to become a better, more confident writer.

Telephone: (608) 263-1992
Location: 6171 Helen C. White Hall

OTHER COE SERVICES

International Student Services (ISS)
http://www.iss.wisc.edu/

To maintain F-1 and J-1 status, international students must be enrolled in a full course of study each fall and spring semester. For undergraduate students, a full course of study is 12 enrolled credits per semester. Summer enrollment is not required by the US federal government for F-1 and J-1 visa holders unless you are a new student (with a summer school reporting date on your I-20 for initial attendance).

Check with an advisor in the International Student Services (ISS) Office if you want to confirm that you are in compliance with your visa regulations. There are valid academic and medical reasons for an international student to reduce his/her credit load. For any semester an international student intends to reduce his/her course load, he/she must complete the Reduced Course Load for F-1 and J-1 Students Form, have his/her academic advisor or medical professional sign the form, and submit the form to the ISS Office for review. The form is available at:
http://www.iss.wisc.edu/upload/documents/rcl.pdf
University Health Services (UHS)
http://uhs.wisc.edu/

Students may seek medical assistance through UHS in the following areas: primary care, women’s health, HIV and sexually transmitted infections, allergies and immunizations, dermatology, health concerns for those travelling abroad, sports medicine, and psychiatric services. Most medical services are prepaid and included in student fees and tuition.
To schedule an appointment, call: (608) 265-5600/ Location: 333 East Campus Mall 5th and 6th floors/ Hours: Mon, Tue, Thur, Fri: 8:30-5:00/ Wed: 9:00-5:00
Office for Equity and Diversity (OED)
http://oed.wisc.edu/

The Office for Equity and Diversity (OED), promotes, integrates, and transfers equity and
diversity principles to nurture human resources and advance the mission of the University of
Wisconsin-Madison (university). The OED employs multiple approaches to attain its strategic
objectives. These include:

- provide leadership and consultation to develop and implement equity and diversity strategies
  throughout the campus;
- promoting the use of standardized and proactive human resources processes;
- maximizing human resources through the effective use of continuous improvement principles;
- establishing collaborative partnerships with Schools/Colleges and Divisions; and
- coordinating campus compliance with affirmative action and equal opportunity requirements,
  referred to as AA/EEO compliance.

The UW-Madison is committed to providing equal opportunity and equal access and to complying
with all applicable federal and state laws and regulations and University of Wisconsin System and
university non-discrimination policies and procedures. The OED has prepared an informative
Website (http://oed.wisc.edu/dishar.html) containing a series of questions and answers to describe
how our discrimination/harassment complaint process works at the university. These questions and
answers are meant to help employees, applicants for employment, students, applicants for
admission, and anyone using the university’s programs or activities, including visitors to campus,
understand how they can file a complaint of discrimination/harassment and how the investigative
process works.

Transfer Services
http://studentservices. engr. wisc. edu/transfer

Students enrolled in other departments of the University or who have EGR status will be permitted
to transfer into ISyE if and only if their cumulative GPA is at least 2.75; the GPA for all math and
science courses must be at least 2.5.

All students interested in transferring to Industrial & Systems Engineering, please visit:
http://studentservices. engr. wisc. edu/advising/internal_transfer. html

Bonnie Schmidt — Transfer Admissions Coordinator
1150 Engineering Hall, Tel: 608/262-4822
schmidt@ engr. wisc. edu
In Addition to the Regular Curriculum -
Getting More Out of Your Education

Top 10+ things to do to get the most out of your education (and future):

Going to class and getting good grades isn’t enough to beat the competition anymore. You need to integrate what you learn in class into “the real world” and bring ideas from the real world back to your education.

The Obvious

1. Participate in a RESEARCH project or work in a research center. May earn independent study credits.

2. VOLUNTEER IN COMMUNITY OUTREACH ACTIVITIES through an organization like Engineers Without Borders or EPICS. Organizing an event can be an especially great experience.

3. Get INVOLVED IN A STUDENT ORGANIZATION (e.g. IIE, SWE, APM).

4. Complete a CO-OP OR INTERNSHIP POSITION. It helps you figure out what you like and don’t like in a work environment or career. It also helps by giving you practical experience to frame what you’re learning in class. Processes or issues make a lot more sense and are retained better.

5. INCREASE YOUR INTERNATIONAL EXPOSURE. The world is getting smaller every day and it’s a great benefit to know, enjoy and learn from your neighbors. Learn a language even though it’s not a required part of the curriculum. Study or do an internship abroad.

6. Begin to DEVELOP A NETWORK OF ALUMNI by talking with seniors in the department.

The Not-so-obvious

7. MAKE AN OUTLINE BEFORE YOU WRITE SOMETHING. Usually it’s better not to use the formal way they taught you in school; you can just write down sentences stating the main ideas you want to cover in the piece. Make the things you wrote down the main sections, and for each of them make a brief mini-outline of what that section ought to say. Now you have the skeleton of the paper, and the rest is just filling in and then editing. Here also, software such as MS Word can help do this quickly.

8. For any work product (paper, homework assignment, etc.) LEAVE SOME TIME AFTER COMPLETION to review or read through the whole thing and edit. It doesn’t take nearly as much time as producing the work did, but it produces an amazing increase in the quality of the final piece.

9. TAKE AS MANY HUMANITIES COURSES AS YOU CAN, especially history and literature. They give you a perspective on the way humans do things and, in spite of illusions about progress, people don’t change. The humanities also give you a broad base of understanding that will help you when your existence suddenly seems to lack content or meaning – as it will, probably several times during your life. Finally, they even help in your profession: there’s a good chance you will be a manager at some point, and the humanities give you a preview of the irrationality, counterproductive behavior, and general zaniness that you’ll have to manage later.

10. STAY CURRENT WITH TASKS. If you don’t have time to do something as well as you want to, do it less well and hand it in on time. On average, you will do a lot better this way than by waiting and then trying to persuade someone to take a late submission. As the saying says, 80% of life is showing up, and handling things in on time is an important way of showing up (here and in your later career).

11. Learn how to WORK TO SCHEDULE, which is something you will have to do for the rest of your life. Different methods work for different people, but most of the effective ones involve making lists of tasks and due dates and managing the lists so that things get done on time and nothing gets dropped. Software (e.g., MS Outlook for task lists and MS Excel for planning schedules) can help a lot.

12. If you work with others (a team, workgroup or something else) on things with deadlines, ENSURE THAT THERE’S A PLAN (almost always written) for what gets done when. If there isn’t, take the initiative to draft a plan and ask the group to look at it, edit, and approve the final version. It should say what everyone has to do, by when, to get the job done, and it should also say who is responsible for checking that things get done on time and making noise if they’re not.

13. UNDERSTAND THAT ALMOST ALL THE PEOPLE YOU MEET ARE DOING THE BEST THEY CAN. Sometimes that may not be very well, but it’s not because they’re trying to mess up whatever you’re doing: they may be sick, or having a family crisis, or something else. If they work for you and their performance isn’t satisfactory, tell them so, politely but directly and immediately, explain why the performance is unsatisfactory, and ask if you can help get things back on track. Most people really dislike performing badly, and they’ll respond to this when they might not respond to a chewing out. If they respond, the problem is solved. If they don’t, get rid of them as quickly as possible.
Engineering Cooperative Education Program

High-quality education and professional work experience are the building blocks of cooperative education. The UW-Madison College of Engineering Co-Op Services (ECS) Program provides undergraduates with terms of full-time study interspersed with full-time engineering employment. Students interview to compete for placement and may work from one to four work terms for the same employer. A work term is defined as a semester or summer session of employment. There are many excellent Co-Op opportunities in Wisconsin and throughout the United States.

ECS M1002 Engineering Centers Bldg, 1550 Eng Drive
#608-262-3471

Benefits for students who choose to participate in the Co-Op Program include:
- Opportunity to develop interviewing skills
- Awareness of relevance of courses to profession
- Competitive edge in job market upon graduation
- Career options explored in a professional arena
- Salary to help defray expenses of education
- One academic credit per work term completed

Many students find that these educational and employment advantages outweigh any disadvantage in the possible additional time required to graduate. Participation in the Co-Op Program often leads to an offer for placement upon graduation.

Students are eligible to register as cooperative education candidates when they are admitted to their major department. There are two interview periods each year. Interested individuals should check with the ECS Office (M1002 ECB) regarding sign-up deadlines and further information about the program.

ISyE Engineering: Any credits will be used as ISyE Technical Electives, subcategory 5) Undesignated. There is no limit to the number of co-op or internship credits that can be applied toward a degree.

Engineering Study Abroad Opportunities

Studying abroad offers valuable cross-cultural experiences and the opportunity to improve your language skills, learn to live and work in culturally diverse surroundings, and improve your value on the job market. **Planning for your study abroad experience is of utmost importance.** This includes meeting with your academic and/or faculty advisor and meeting with the coordinator of the study abroad experience. When you meet with your academic and/or faculty advisor, please discuss the courses you plan to take abroad in order to ensure an academically successful experience. Make sure you know what courses you need to take overseas to fulfill degree and graduation requirements so that you do not fall behind in your academic progress. Discuss the following topics with your advisor:

- Advisor approval/clearance forms
- Departmental course equivalencies
- DARS designations for courses that fulfill elective credits
- Grading of courses taken abroad
- Completing the last 30 credits abroad (if applicable)

**Students are ultimately responsible for understanding how courses taken abroad will or will not fulfill degree requirements.**
Transferring Courses Taken While Studying Abroad

Engineering students who want to take courses at an international university (study abroad) and have the course credits count for their degree should have the classes approved for transfer prior to leaving.

Students Need To:

- Review their UW DARS to determine what requirements they need/want to fulfill overseas, and consult with their academic advisor for advice about which classes might be best taken during the semester overseas.

- Review the list of established course equivalencies at http://studentservices.engr.wisc.edu/international/course_equivalents.html for their specific program. The courses on this site have been pre-approved.

- Collect detailed course descriptions for the classes they are interested in taking for courses that have not been pre-approved. This list should include about twice as many courses as will be taken because of lack of availability issues at the international school. The list should be set up as a comparison chart showing the ‘away’ class title and description in one column and the suggested comparable UW-Madison class description in the second column.

- Consult with their departmental advisor for approval of courses within their major that they plan to take. A course approval form http://studentservices.engr.wisc.edu/international/CourseApprovalForm.pdf must be signed for each class you get approved. **Students should confirm # of credits of transfer if possible prior to enrollment to ensure the # of credits taken abroad equal the # of credits for transfer at UW.**

- Students must consult with the CoE International Engineering Studies and Programs Coordinator for help in determining equivalencies for courses outside their major requirements general education requirements, liberal studies requirements, etc.) and getting approval for these courses: M1002A Engineering Centers Building; 608-263-2191; international@engr.wisc.edu

- Take the course approval information to the International Engineering office prior to their departure. A copy will be made and given to the student, and the originals will be kept in the student’s file at the International Engineering Office.

- **Prior to returning** to UW-Madison, students need to have their transcript from abroad sent directly to: International Engineering Studies and Programs Room M1002A Engineering Centers Building 1550 Engineering Drive Madison, WI 53706 USA

- **Prior to returning** Students should check in with their faculty and academic advisors as needed throughout their study abroad program and are **required** to do so during the required ISyE Advising Day period prior to the following semester prior to enrollment.

- **After arriving back** at UW-Madison, students need to meet with the CoE International Engineering Studies and Programs Coordinator to go over their transcript and course approvals. They will match the approvals with the course titles on your transcript and complete the allocation of credits so they show up correctly on your DARS.
International Engineering Studies & Programs (IESP)
http://studentservices.engr.wisc.edu/international/

International Engineering Studies and Programs (IESP) is a service unit within the College of Engineering that prepares UW-Madison engineering students to study abroad. As an IESP participant, you can choose from more than 50 study abroad programs in the Americas, Asia and the Pacific, and Europe and most programs are available for a semester or year. Many programs offer instruction in English. The courses completed abroad can help you make progress towards their engineering degree or allow you to explore additional academic areas.

While abroad on an IESP program, you will maintain student status and you (as an engineering student) will earn pass/fail grades for coursework completed overseas. If you take liberal studies courses while on an IESP program, you can still elect to take up to two additional liberal studies courses pass/fail at UW-Madison. The College of Engineering does not consider study abroad programs in residence; therefore you will need to request a waiver (at the time of application) of the college’s residency requirements if you plan to study abroad during your final 30 credits.

The majority of programs are exchanges, which means that you would pay the same tuition as you currently do at UW-Madison. Financial aid is available to all UW degree-seeking students on study abroad programs – even those who have not received aid in the past. A minimum GPA of 3.0 (for most programs) is required to apply. Application deadlines are October 1 for the spring semester, and March 1 for the fall semester or for the entire academic year.

In order to obtain a certificate in International Engineering, students must have a five-week (minimum) study abroad experience. Additional information on the International Engineering certificate can be found in the following pages.

Contact Person: Amanda Hammatt
Email: international@engr.wisc.edu
Telephone: (608) 263-2191
Location: M1002A Engineering Centers Building

International Academic Programs (IAP)
http://www.studyabroad.wisc.edu/

International Academic Programs (IAP) offers over 150 study abroad programs to UW-Madison students across campus. Instruction is in a wide range of languages, including many options in English. Most programs are limited to course options in social sciences and humanities through a limited number of programs do have engineering courses available. While abroad on an IAP program, you will maintain your student status and you are typically assigned a letter grade for the courses that you will take. If you have questions about the grading basis for a particular course, you will need to talk both to IAP and to your advisor. The College of Engineering does not consider study abroad programs in residence; therefore you will need to request a waiver (at the time of application) of the college’s residency requirements if you plan to study abroad during your final 30 credits.

For more information, please contact IAP at: 250 Bascom Hall, 500 Lincoln Drive, Madison, WI 53706, T: 608/265-6329, F: 608/262-6998, peeradvisor@bascom.wisc.edu. Engineering students with additional questions regarding how their IAP study abroad program will or will not satisfy their engineering degree requirements can contact Bonnie Schmidt (1150 Engineering Hall, 608/262-4822, schmidt@engr.wisc.edu)

Other UW-Madison Study Abroad Experiences

If a UW-Madison engineering student chooses to study abroad through another UW-Madison study abroad unit it is extremely important that the student meet with the following people before going abroad: (1) their academic and/or faculty advisor; (2) the coordinator of the study abroad program; and (3) Bonnie Schmidt (1150 Engineering Hall, 608/262-4822, schmidt@engr.wisc.edu).
Certificates Programs in the College of Engineering

While UW-Madison does not have minors, it does offer organized programs in specific disciplines that lead to a certificate and a transcript notation indicating successful completion. A complete list may be found here:  [http://studentservices. engr. wisc. edu/advising/degrees/certificates. html](http://studentservices. engr. wisc. edu/advising/degrees/certificates. html)

**Biology in Engineering Certificate**
[http://studentservices. engr. wisc. edu/advising/degrees/certificates. html](http://studentservices. engr. wisc. edu/advising/degrees/certificates. html)

The Biology in Engineering Certificate, administered by Academic Affairs in the College of Engineering, is designed for engineering students who want to strengthen their biology backgrounds. It is offered especially to encourage engineering students in traditional disciplines to prepare themselves to understand the special engineering problems in biology and medicine. A student successfully fulfilling the requirements will have the notation "Biology in Engineering Certificate" added to their transcript.

The 15-credit Biology in Engineering Certificate (BEC) program was designed and will be administered by a BEC Committee composed of faculty from multiple engineering disciplines. Students normally should begin the program during their sophomore or junior year, but seniors may also apply. For more information, visit 2620 Engineering Hall or call 608/262-3484.

**Engineering for Energy Sustainability Certificate**
[http://www. energy. wisc. edu/?page_id=1077](http://www. energy. wisc. edu/?page_id=1077)

The objective of the Engineering for Energy Sustainability certificate program is to offer undergraduate students a suite of courses addressing energy sustainability that span across the engineering curriculum, with firm roots in "real world" design and engineering practices. Students interested in completing the certificate program must contact a particular faculty member in his or her major department to apply.

The student faculty member must, together complete the Declaration of Intent and Tentative Study Plan in order to enter the certificate program.

**Certificate in Engineering Risk, Uncertainty, and Decision Analysis**

The design and analysis of engineering systems are becoming much more dependent on the ability of the engineer to analyze the system in the context of uncertainties in system performance, evaluate the reliability of normal operation and the risk of off-normal operation, and then make appropriate decisions to maintain reliability with optimal performance. As a result, many industries such as manufacturing, chemical, and nuclear are looking for engineering graduates with appropriate understanding and knowledge in these areas.

The Certificate in Engineering Risk, Uncertainty and Decision Analysis includes courses in statistics and probability, modern uncertainty analysis, decision analysis, and probabilistic reliability and risk assessment. The primary goal of this program is to significantly increase the number of engineers with a fundamental understanding of uncertainty, reliability and risk-based decision making.
Certificate in Integrated Studies in Science, Engineering and Society (ISSuES)  
http://sts.wisc.edu/education/ISSuES.html

The Certificate in Integrated Studies in Science, Engineering and Society (ISSuES) is offered to all undergraduate students, but it is aimed especially at undergraduate engineering students. The program is designed to provide students outside of the College of Letters and Sciences coherent exposure to the social sciences and humanities with an emphasis on the relationship between science, technology, engineering, and society. Students will be required to take a variety of courses that relate to and build on each other, each one contributing to a major focus of the certificate. Currently, the ISSuES Certificate offers four focuses, each with a corresponding cluster of courses from all across campus. The four themes are: ethnic focus, leadership focus, design focus, and general focus.

Certificate in International Engineering  
http://studentservices engr.wisc.edu/advising/degrees/cert_IntlEngr_req.html

The Certificate in International Engineering provides recognition for a student’s efforts to prepare for an international career by learning about one or more countries other than the United States. An undergraduate student in the College of Engineering or the Department of Biological Systems Engineering can earn the Certificate by completing at least 16 credits worth of courses with a primary focus on the language, culture, history, geography, society or institutions of a particular country or region of the world.

For reference, information on Areas Studies Programs at UW-Madison is available from the International Institute here: http://www.intlstitute wisc.edu/MemberPrograms/index.htm

Certificate in Japanese Studies for Engineering Students  
www.engr.wisc.edu/epd/tic

The Certificate in Japanese Studies for Engineering Students helps undergraduate engineering students gain conversational and written skills in colloquial Japanese, reading and translation skills in technical Japanese, and an understanding of Japanese culture. Increasing numbers of American companies conduct business in Japan, and many Japanese companies have expanded their activities in the United States. These companies need engineers who can read and communicate in both English and Japanese. The Certificate in Japanese Studies addresses this need. The certificate requires 27 credits, including three semesters of Japanese language, two semesters of intermediate-level technical Japanese, and one additional course related to Japanese language or culture. Interested students should begin taking Japanese courses in their first year.

For further information:  
Professor James L. Davis  
Room M1056D Engineering Centers Building  
608/262-4810  
jdavis@engr.wisc.edu
The Technical Communication Certificate (TCC) complements all undergraduate engineering degrees. The TCC curriculum helps students gain a broad range of skills in these areas: Written, oral, and graphic communication Online communication and electronic publishing Team projects and interpersonal communication Professional communication through the TCC internship

The Technical Communication Certificate has established itself as a program that meets industry and government agencies’ demands for engineers with skills as communicators and for communication specialists. Typically, engineers spend half of their time or more communicating in their roles on project teams, as technical experts, or as managers. Because employers value well-developed communication skills, TCC courses will enhance success in co-op/intern positions and post-graduation careers.

The more than 200 TCC graduates overwhelmingly confirm not only that the certificate gave them an edge over other candidates during the recruitment process, but also that the communication knowledge, skills, and attitudes they acquired while in the program helped them succeed in their jobs and helped prepare them for the communication and management tasks in today’s multifunctional team environments.

The TCC requires 24 credits, including 9 credits in technical courses (many already required for any engineering degree) and 15 credits in technical communication (3 or 5 communication credits might count toward technical, liberal, or free electives, depending on the major). Aside from the relevant courses offered in the TCC, students especially value the close contact with faculty through advising, independent study projects, and collaboration. Students in the program often take on leadership roles in other college or campus-wide student organizations and projects, further developing their communication, team, and management skills.

For further information
Department of Eng Prof. Development (EDP)
Laura Grossenbacher
M1050 Engineering Centers Building
(608) 262-2472
grossenb@engr.wisc.edu

Other Certificates – Official List

The Office of the Registrar, under the direction of the Office of the Provost and Vice Chancellor for Academic affairs, maintains the official list of certificate programs authorized for the UW-Madison. Only certificates on this official list (Website listed above) appear on the student’s transcript.

Listed after each certificate is the code for the College or School through which it can be obtained and the level of student to which it is available.
After a BSIE

The Department of Industrial and Systems Engineering at UW-Madison offers a comprehensive range of advanced-degree programs to help link people and technology. The department is one of the nation's premier teaching and research facilities devoted not only to improving contemporary production and service systems but also to aiding people who operate the systems.

Engineering Career Services (ECS)
https://ecs. engr. wisc. edu/ public/ index. php

Engineering Career Services provides lifetime tools for successful career development in a rapidly changing world. ECS helps students in preparing for internship/co-op as well as job searches (resume & cover letter writing, listing of potential employers, etc), practicing interviewing skills (mock interviews, sample interview questions), and other important career information such as negotiating job offers and salaries. Students can become lifetime members of ECS by registering and paying a one-time $20 fee.

The staff at ECS teaches a course called Career Orientation (listed as PRO OR 200 under Professional Orientation). The course generally meets one time per week and is worth one credit. Students gain exposure to the world of work and valuable knowledge and skills related to the job search.

Contact Person: Assistant Dean John Archambault
Telephone: (608) 262-3471
Location: M1002 Engineering Centers Building

ISyE Graduate Program Information

The Department of Industrial and Systems Engineering at UW-Madison offers opportunities for graduate study leading to the Master of Science (MSIE –Professional or MSIE) and Doctor of Philosophy degrees in Industrial Engineering. Both of the MSIE Professional or MSIE student entering programs with a BSIE will have satisfied all the prerequisites for their program.

Please visit: http://www. engr. wisc. edu/ ie/ prospective/ grad/ for further information.

An informative pamphlet, including admissions and program requirements, is also available at the North Student Services office in 3182 ME - please contact Staci Rubenzer, ISyE Graduate Coordinator, for further information at srubenzer@engr.wisc.edu.

Master of Science — Professional Industrial Engineering Option 24 credits

For students with a UW Madison ISyE undergraduate degree, this option allows a student to obtain a Masters of Science degree in just one academic year (two semesters) beyond the Bachelor's Degree. The option provides ISyE students the opportunity to specialize in one of the six areas in ISyE or to make their own program to fit their own career goals. This option's individually designed structure is flexible to meet a variety of needs. It is offered to graduates of the UW-Madison Department of Industrial and Systems Engineering Bachelor of Science program. Students in the UW-Madison ISyE undergraduate program who are interested in this option should meet with their advisor to discuss the program. The Professional Industrial and Systems Engineering Option is intended primarily for students who do not plan to pursue a PhD degree. Those students interested in obtaining a PhD should consult their academic advisor.
Master of Science—Industrial Engineering (MSIE)  Min 30 credits

An alternative to finding a job is to continue your education and obtain a Master of Science in Industrial and Systems Engineering (MSIE) degree. One advantage of this option is the opportunity to explore an area of interest in more depth and more comprehensively. (Visit http://www.engr.wisc.edu/ie/research/)

The areas of Industrial and Systems Engineering graduate specialization are:

1. Human Factors and Ergonomics
   Combines an understanding of technology, behavioral sciences, systems analysis, and special skills in implementing organizational change. The purpose of the program is to produce graduates capable of analyzing and designing the complex systems involving people at work. Graduates will have competence in both the social and technological aspects of a problem and be aware of new innovative ideas of work organization appearing around the world.

2. Quality Engineering
   Designed to provide the necessary background for a professional career in industry or government. Emphasis is placed on the foundations of quality improvement: organizational dynamics, change strategies, business and statistical methods. The list of elective courses is flexible enough to enable the student to specialize in the skills of manufacturing systems, sociotechnical engineering, health systems, and decision sciences.

3. Manufacturing & Production Systems Engineering
   Intended to provide the skills and expertise necessary to compete successfully in a manufacturing environment. These skills include knowledge of manufacturing processes and machines and their control, knowledge of the essentials of manufacturing systems design and analysis, and knowledge and “hands-on” experience with modern manufacturing technology. After satisfying the necessary breadth requirements of the program, students may choose to study, in more depth, a number of specialized topics from the approved course offerings to enhance their career readiness.

4. Decision Science/Operations Research
   Aims to improve the quality of decisions about the management of scarce resources. Problem solving in ISYE entails recognizing and identifying decision problems as well as generating, evaluating, choosing, and implementing solutions to them. The DS/OR area seeks to train students in the methodology used in decision science and operations research, in order to prepare them for careers in government and industry.

5. Health Systems Engineering
   This option seeks to train students to look at broad issues in health care, including inpatient and outpatient care, health promotion and prevention, long-term care, quality improvement and management, health care technology, patient safety, programs and systems evaluation.

Master of Business Administration (MBA)

An increasingly popular option for Industrial and Systems Engineering graduates is to pursue a Master of Business Administration (MBA) degree. Some graduates may find it advantageous to enter the program directly after graduation; others may work on the degree part-time through the evening MBA program; some others may return to school full-time after working in industry.

However you decide to do it, before an MBA can be granted at UW-Madison’s School of Business, the student must complete a number of foundation courses. These courses, plus 30 advanced credits, are necessary for the degree. The foundation courses may be taken, however, at the undergraduate level.
Student Organizations

The Industrial and Systems Engineering Department highly recommends that students become involved in extra-curricular organizations. These organizations include: Alpha Pi Mu (APM); Human Factors and Ergonomics Society (HFES); The Institute of Industrial Engineers (IIE); Society of Manufacturing Engineering (SME); Society of Women Engineers (SWE); Student Advisory Committee (SAC) and a host of others.

These organizations are designed to increase the student's understanding of the field of Industrial and Systems Engineering through interaction with professors, professionals and peers. The experience provides you with a wide network of people and resources. Equally important, it is a great resume builder! Activities include a wide variety of lectures, plant trips, and social events.

Following is a brief description of each organization. For more information, see the Student Organization Bulletin board just outside Room 369 Mechanical Engineering Building.

**ALPHA PI MU – APM**
[http://www.engr.wisc.edu/studentorgs/apm/](http://www.engr.wisc.edu/studentorgs/apm/)

Alpha Pi Mu has student chapters in major technical universities across the nation. The official statement of purpose of Alpha Pi Mu is "to confer recognition upon the student of industrial engineering who has shown exceptional academic interests and abilities in their field."

All upcoming events are posted on the ISyE Student Organizations bulletin board on the third floor of the Mechanical Engineering Building.

Alpha Pi Mu hopes to bring ISyE students together through extracurricular activities. Simply getting to know other students within your major can provide benefits scholastically, socially, and professionally.

Activities include:
- Organization of the annual ISyE Scholarship Banquet
- "Aspects of Industrial Engineering"—seminars given by ISYE professors
- Attendance at ISYE Faculty Meetings—to stay abreast of the latest academia updates
- Tutoring Services
- Networking and motivational meetings

Requirements to be invited into this honor society are:
- Junior Status – must be in the top 1/5 of your class
- Senior Status – must be in the top 1/3 of your class

Questions about APM can be directed to:

Faculty Advisor: Prof. Jingshan Li, 3222 ME, 890-3780, jingshan@engr.wisc.edu

**HUMAN FACTORS AND ERGONOMICS SOCIETY – HFES - Student Chapter**
[http://www.engr.wisc.edu/studentorgs/hfes/about.html](http://www.engr.wisc.edu/studentorgs/hfes/about.html)

The student chapter of this organization provides graduate and undergraduate students with a forum to discuss, learn about, participate in, and integrate the various disciplines influencing the field of human factors.

The group sponsors a variety of academic and social events throughout the school year, such as guest speakers, field trips, brown bag lunches, outreach programs, fund raising, networking, and projects with faculty and local industries.
For further information:  
Human Factors & Ergonomic Society  
Engineering Centers Building  
1550 Engineering Drive  
Madison, WI 53706-1609  
hfes@cae.wisc.edu  

Faculty Advisor: Doug Wiegmann, 3214 ME, 890-1932, dawiegmann@engr.wisc.edu

INSTITUTE OF INDUSTRIAL ENGINEERS – IIE – Student Chapter  
http://www.engr.wisc.edu/studentorgs/iie/  

IIE is an international industrial engineering professional society. Currently, there are more than 200 chapters in North America plus university chapters at most universities offering industrial engineering curricula. In areas around Madison, Beloit and Janesville, professional industrial engineers are served by the Rock Valley Chapter. ISyE students are eligible to become associate members of IIE and pay dues at a reduced rate.

The objective of IIE is to promote the industrial engineering profession. Members benefit from attending monthly meetings that feature authoritative speakers or plant visits. Meeting industrial engineers from different industries broadens one’s professional awareness. Each member is entitled to affiliation with two of the 17 division organizations that publish newsletters to inform members of new ideas and developments in different fields, hold special conferences and seminars, and publish monographs on specific topics.

Being an IIE member, you become eligible for employment services and many other programs sponsored by IIE such as regional and national conventions, scholarships, and continuing education programs.

Questions about IIE can be directed to:  
Room 1090 Engineering Centers Bldg.  
1550 University Avenue  
Madison WI 53706  
iie@cae.wisc.edu  

Faculty Advisor: Raj Veeramni, 4101 ME, 262-0861, raj@ie.engr.wisc.edu

SOCIETY OF MANUFACTURING ENGINEERS – SME  
http://msep.engr.wisc.edu/index.php/students/faq  

The Society of Manufacturing Engineers (SME) is an international professional society for engineers in the field of manufacturing. The student chapter of SME at the University of Wisconsin-Madison is one of the most active student organizations on campus. (They won second-prize at the national level for the biggest increase in student chapter membership in 1993.) Membership in SME offers UW-Madison students a number of important benefits:

- Free subscription to SME’s leading publication, Manufacturing Engineering, to keep you updated on the latest developments in manufacturing technology and applications in industry. Members also have access to SME’s extensive database and library.
- Free resume service through the SME student database that is sent to manufacturing companies in the United States, Canada, and overseas.
- Access to the SME-ONLINE Electronic Bulletin Board that includes an up-to-date listing of job opportunities in the manufacturing sector.
- Interaction with local manufacturing industry at monthly meetings of the SME senior chapter in Madison.
- Participation in the SME Shadow Program that enables a student to interact with an engineer in a local manufacturing company to learn first-hand about the activities performed by the engineer and the type of manufacturing knowledge, skills, and computer-aided tools employed by the person.
- Regular meetings involving social and technical program activities such as educational seminars on cutting-edge technologies and applications by representatives from the manufacturing industry.
- Trips to manufacturing facilities and trade shows
- Program to obtain certification as a Manufacturing Technologist
- Free graduation gift certificate of $700 value
- Access to various technical groups within SME with focused interest in areas such as electronics manufacturing, composites manufacturing, computer and automated systems, machining technology, machine vision, material forming, rapid prototyping, and robotics.
- Opportunities to develop leadership, management, and team coordination skills.
- Opportunities to develop a network of contacts in the manufacturing industry.

To obtain membership forms and additional information on ongoing activities of the SME Student Chapter, check the SME bulletin board in the lobby of the Mechanical Engineering Building.

Faculty Advisor: Prof. Shiyu Zhou, 3254 ME, 262-9534, szhou@engr.wisc.edu

**SOCIETY OF WOMEN ENGINEERS – SWE**
http://www.engr.wisc.edu/studentorgs/swe/

SWE provides opportunities to network and get more information about career options in engineering. It is a group committed to expanding opportunities for women in engineering, as well as encouraging women to enter the field. It provides a built-in support network for students. Incoming freshmen are paired with a current engineering student who can provide them with information about courses, professors, and college life. The UW-Madison chapter is tied into both regional and national SWE networks, allowing members to interact with women engineers from the around the country through SWE's national conventions.

Corporations are actively involved in supporting SWE, giving members the opportunity to make valuable industry contacts. The chapter produces an annual book of its members' resumes, which is sold to corporations hiring students for permanent and co-op positions. SWE members make friends and contacts that often last long after they have graduated. The leadership and organizational skills they develop prove to be powerful assets in the transition from student to professional engineer.

For further information:
Society of Women Engineers
1085 Engineering Centers Building
1550 Eng Drive (608) 262-3387 swe@cae.wisc.edu,
262-3387
Faculty Advisor: Professor Vicki Bier, 3234 ME, 262-2064, bier@engr.wisc.edu
Undergraduate Course Descriptions

The course numbering plan is: 3XX - Juniors (e.g., ISyE 324), 4XX - Seniors, 5XX - undergraduate elective available for graduate credit, and 6XX - primarily for beginning grad students but available to advanced undergraduates. After each course description there is a tabulation of how many times this course was offered in the last five academic years: I = Fall; II = Spring; S = Summer Session.

001 Cooperative Education Program. 1 cr Work experience which combines classroom theory with practical knowledge of operations to provide students with a background upon which to base a professional career in industry. Prereq: Sophomore standing. I5; I15; S

191 The Practice of Industrial Engineering. 1 cr Introduction to Industrial Engineering subject matter areas, problem types, and design/analysis approaches, techniques, and methodologies. Special emphasis on formulation and design alternatives for problem solving. Prereq: Not open to students with advance standing in ISYE. I3; I15; S

313 Engineering Economic Analysis. 3 cr (same as ACCT I S 313) Financial accounting principles and cost systems, interpretation and use of accounting reports and supplemental information for engineering economic analyses, consideration of cost-volume-profit analyses, use of discounted cash flow techniques, flexible budgeting, transfer pricing, and capital budgeting. Prereq: Sophomore standing or consent of instructor. I5; I15; S

315 Production Planning and Control. 3 cr Techniques and applications of control concepts in the design of inventory, production, quality and project-planning systems; use of the computer as a component in such systems. Prereq: CS 110 or equivalent, Stat 311 . I2; I15; S


321 Simulation Modeling Laboratory. 1 cr Computer exercises involving generation and analysis of random variables, spreadsheet models of queuing systems, use of simulation software packages. Project. Prereq: Concurrent registration in ISYE 320. I4; I14; S

323 Operations Research-Deterministic Modeling. 3 cr Basic techniques for modeling and optimizing deterministic systems with emphasis on linear programming. Computer solution of optimization problems. Applications to production, logistics, and service systems. Prereq: Math 222, ISYE 313, and either Math 320 or 340. I5; I10; S

349 Introduction to Human Factors. 3 cr (Same as Psych 349) Design for people-machine interaction, including an introduction to the relevant underlying human sciences. Theory, data, and measurement problems in human information processing, anthropometry, training and industrial safety. Laboratories, discussions, and a design project. Prereq: Intro. Probability or Statistics. I5; I15; S

415 Introduction to Manufacturing Systems, Design, and Analysis. 3 cr Introduction to the technologies, processes and systems of modern discrete part manufacturing. Emphasis on development of an understanding of the behavior of integrated systems. Prereq: ISYE 315, 320, 321 or consent of instructor. I5; I15; S

417 Health Systems Engineering. I; 3 cr. Introduction to the application of industrial engineering methods to the analysis and improvement of health care delivery. Exploration of common problems of decision making and control in health care. Examination of social, regulatory and economic factors unique to health care. P: ISYE 313, 320, 323 and 349, or cons inst.

425 Introduction to Combinatorial Optimization. 3 cr (Same as CS/Math 425) Exact and heuristic methods for key combinatorial optimization problems such as: shortest path, maximum flow problems, and the traveling salesman problem. Techniques include problem-specific methods and general approaches such as linear programming and branch-and-bound. Prereq: Math 221 or CS 302 or consent of instructor. I0; I10; S

449 Sociotechnical Systems in Industry. 3 cr The analysis of industrial jobs and organizations. Classical theories and techniques, such as scientific management and work measurement, recent developments such as quality of working life and sociotechnical systems analysis. Review of literature and field-site applications. Prereq: ISYE 349 and MHR 300. I0; I10; S

460 Uncertainty Analysis for Engineers. 3 cr. This course introduces undergraduates to approaches for quantifying uncertainty in engineering analysis. Both analytical and computational methods are demonstrated.

66 Theory of Design. 3 cr Determining the real design problem, generating innovative alternatives and selecting an effective solution. Concepts of systems, models, and strategies for purposeful activities. Design and control of design projects; organization of group interactions. Project. Prereq: ISYE 313 and 315. I5; I15; S

476 Industrial Engineering Design. 3 cr Complete design of an industrial engineering system in a real world setting, e.g., manufacturing, hospital, communications, food processing, distribution, transportation, etc. Prereq: Senior Standing in ISYE or consent of instructor or concurrent registration. I3; I13; S

510 Facilities Planning. 3 cr (Same as ME 510) Introduction to plant location theory and analysis of models of plant location; models for determining plant size and time phasing; line balancing models; techniques for investigating conveyor and other material handling problems, and models of plant layout. Prereq: ISYE 315, 323, 349 or consent of instructor. I5; I15; S
512 Inspection, Quality Control, and Reliability. 3 cr (Same as ME 512) Inspection data for quality control, sampling plans for acceptance inspection, control charts for production processes. Introduction to reliability models and acceptance testing. Prereq: Stat 224 or consent of instructor. 15;II;S0

513 Analysis of Capital Investments. 3 cr (Same as ME 513) A second course in quantitative methods for analyzing capital investments in technological environments, both public and private. Replacement models; comparison of alternative investment models; risk analysis; case studies. Prereq: ISYE 313, 323 and Stat 311. 12;II;S0

515 Engineering Management of Continuous Process Improvement. 3 cr Addresses the role of the industrial engineer as a "manager" of continuous improvement in design and production processes. Provides modern tools and techniques for planning and managing team projects, integrating the concepts of total quality, data based decision making, and resource management. 15;II;S0

516 Introduction to Decision Analysis. 3 cr Overview of modeling techniques and methods used in decision analysis, including multivariate utility models, decision trees, and Bayesian models. Psychological components of decision making are discussed. Elicitation techniques for model building are emphasized. Practical applications through real world model building are described and conducted. Prereq: Stat 311, or Math 431, or consent of instructor. 15;II;S0

520 Quality Assurance Systems. 3 cr Introduces engineers to applications of total quality concepts and tools to develop, implement, and maintain an effective quality assurance system in a manufacturing or service organization. Emphasis is on documentation development, team-based improvement strategies, and international quality standards. Prereq: Sr or Grad standing, or consent of instructor. 10;II;S0--New Course Spring 2000

525 Linear Programming Methods. 3 cr (Same as Comp Sci, Math and Stat 525) Real linear algebra over polyhedral cones, theorems of the alternative for matrices. Formulation of linear programming problems. Duality theory and solvability. The simplex method and related methods for efficient computer solution. Perturbation sensitivity analysis. Applications and extensions, such as game theory, linear economic models, and quadratic programming. Prereq: Math 320 or 340 or 443 or consent of instructor. 15;II;S0

549 Human Factors Engineering. 3 cr (Same as Psych 549) Analysis and design of man-machine systems using human performance models and data. Emphasis on systems involving communication and control. Projects using digital and analog computer simulation techniques for system design. Prereq: ISYE 349 or equivalent. 11;II;S0

552 Human Performance and Accident Causation. 3 cr Course Description: Evaluation, analysis, and design recommendations for improving human performance and productivity in applied settings. Collection of instrument-based and user survey data. Emphasis on ergonomics, human factors and sociotechnical systems engineering approaches and problems. Design project required. Pre-Reqs: Ind Engr 349 & EPD 397, or cons inst

555 Human Performance and Accident Causation. 3 cr A system view of accident causation, with emphasis on the human performance limitations important in industrial and other accidents. Models of causation, data collection systems, economic evaluation, and safety programs. Small group projects. Prereq: ISYE 349 or Psych 225 or equivalent and an introductory Stat course or consent of instructor for Grad students. 12;II;S1

556 Occupational Safety and Health Engineering. 3 cr Introduction to safety and health hazards in the industrial environment. This course provides engineers with the fundamentals of measurement, evaluation, regulation, and control of hazardous conditions, toxic substances, physical agents, and dangerous processes in industrial operations. Prereq: ISYE 349 or grad standing or consent of instructor. 10;II;S0

558 Introduction to Computational Geometry. 3 cr (Same as ME 558) Introduction to fundamental geometric computations and algorithms, and their use for solving engineering and scientific problems. Computer representations of simple geometric objects and paradigms for algorithm design. Applications from areas of engineering analysis, design and manufacturing, biology, statistics, and other sciences. Prereq: CS 367 or equivalent, Math 234 or equivalent, or consent of instructor. 10;II;S0

559 Patient Safety and Error Reduction in Health Care. (Cross listed with Population Health 559 and Industrial Engineering 559) II; 2 cr This course discusses the nature and magnitude of hazards to patients in various health-care settings, and presents the student with techniques to analyze the risks and to address the problems, in order to reduce errors and create a safe patient-care environment. Practical tools discussed include probabilistic risk assessment methods, failure mode and effects analysis, human factors analysis and error classification systems, and quality management. Discussions of patient safety standards, recommendations from agencies, and continual quality improvement, along with many examples of applications in various settings, anchor the studies in the clinical world.

564 Occupational Ergonomics and Biomechanics. 3 cr Introduction to how to design manufacturing and industrial operations in which people play a significant role, so that human capabilities are maximized, physical stress is minimized, and workload is optimized. Examples and topics emphasize industrial applications. Prereq: ISYE 349; Grad standing or consent of instructor. 13;II;S0

565 Ergonomics in Service. 3 cr Analysis, evaluation and design of office systems. Sociotechnical, ergonomic and job design issues. Performance of ergonomic evaluations in offices. Project. Prereq: ISYE 349 or consent of instructor. 12;II;S0

574 Methods for Probabilistic Risk Analysis of Nuclear Power Plants. 3 cr (Same as NEEP 574) Methods for risk and reliability analysis of engineered systems, particularly as applied in the nuclear power industry. Fault trees and event trees, Bayesian data analysis, probabilistic risk management. Some familiarity with nuclear plant safety systems is helpful, but not required. Prereq: Stat 311 or Math 431 or consent of instructor. 10;II;S0

575 Introduction to Quality Engineering. 3 cr Introduction to statistically based quality improvement methods useful in industrial settings; observational methods and design of experiments; experimentation to discover influential factors and to analyze sources of variation; robust products. Prereq: One intro. course in statistical methods or consent of instructor. 15;II;S0
578 Facilities Location Models. 3 cr  (Same as OTM 578) Theory and methods of facility location. Plant and warehouse siting, plant layout problems, and location of services facilities such as hospitals and fire stations. Cases of actual applications. Prereq: OIM 410 or ISYE 323 or equivalent. 10;II;S

605 Computer Integrated Manufacturing. 3 cr  An introduction to computer-integrated design and manufacturing with a focus on manufacturing process planning. Emphasis on concurrent engineering principles, manufacturing process engineering, computer-aided process planning, NC programming, and CAD/CAM integration. Course provides experience with CAD/CAM software and NC machines. Prereq: ISYE 315 or consent of instructor. 15;II;S

610 Design of Program Evaluation Systems. 3 cr  Design of systems for evaluating the effectiveness (efficiency, benefits, costs, resource utilization, contribution) of sociotechnical systems. Measurement, analysis and interpretation of results including implications for engineering research. Extensive case studies. Prereq: Sr or Grad standing in ISYE or consent of instructor. 10;II;S

611 Systems Modeling. 3 cr  Fundamental approach to the description of the structure and behavior of complex systems. Epistemological foundations; the philosophy of general systems theory; qualitative modeling--cross impact matrices and oval diagramming; systems dynamics--linear and nonlinear models; emphasis on modeling of behavior in industrial, social and biological settings. Prereq: Math through differential equations, Graduate standing in ISYE and consent of instructor. 10;II;S

612 Information Sensing and Analysis for Manufacturing Processes. I; 3 cr. Focuses on the sensing and multivariate data modeling and analysis techniques for monitoring, diagnosis, and quality improvement of manufacturing processes. The techniques introduced can find wide applications in health care, financial engineering, service industry applications, human factors, etc. P: Math 320 and Stats 311, Sr or Grad st, or cons inst.

613 Multiple Criteria Evaluation: Utility Assessment Models & Methods. 3 cr  Evaluation problems involving trade-offs on multiple performance criteria or dimensions of value. Introduction to the mathematical theory and real-world practice of developing quantitative models to represent highly qualitative judgments that are made in systems evaluations involving multiple criteria. Prereq: Math 234 or equivalent and Grad standing or consent of instructor. 11;II;S

615 Production Systems Control. 3 cr  Intermediate to advanced course stressing the application of recent operations research techniques to production planning, scheduling and inventory control. Prereq: ISYE 315, 320, 321, 323, State 311, 312. 10;II;S

617 Health Information Systems 10;II;S

620 Simulation Modeling and Analysis. 3 cr  (Crosslisted with OTM). Introduction to simulation modeling and analysis techniques with application to production, logistics, service, and other systems. Emphasis on model building, application of basic statistical data analysis, and the use of simulation for design, evaluation, and improvement of such systems. Introduction to available software. Case studies. P: Comp Sci 302 or equiv and Stat 312 or equiv.. 13;II;S

624 Stochastic Modeling Techniques. 3 cr  Techniques for modeling in which uncertainty is an essential factor. Emphasizes why, how and when techniques can or cannot be applied, rather than their mathematical derivation. Case studies and/or examples from such areas as logistics, production, and service industries. Prereq: ISYE 313, Stat 311, and either Math 320 or Math 340. 11;II;S

625 Discrete Event Simulation. 3 cr  Analysis and optimization of real-world systems by means of computer simulation. Structure of simulation models, simulation languages, and the statistical aspects of simulation. Prereq: CS 367, Stat 311 or equiv. 10;II;S


633 Queuing Theory and Stochastic Modeling. 3 cr  (Same as Bus/Math 633) Reliability theory; coherent systems and reliability bounds. Markovian queues and Jackson networks. Steady-state behavior of general service time queues. Priority queues. Approximation methods and algorithms for complex queues. Simulation. Dynamic programming; applications to inventory and queuing. Prereq: ISyE/Math/Stat 632 or consent of instructor. 10;II;S

635 Tools and Environments for Optimization. 3 cr  (Same as CS 635) Formulation and modeling of applications from computer sciences, operations research, business, science and engineering involving optimization and equilibrium models. Survey and appropriate usage of software tools for solving such problems, including modeling language use, automatic differentiation subroutine libraries and web-based optimization tools and environments. Prereq: CS 302, Math 340 or equiv. 12;II;S—First taught Spring 98

641 Design and Analysis of Manufacturing Systems. 3 cr  (Same as ME 641) Covers a broad range of techniques and tools relevant to the design, analysis, development, implementation, operation and control of modern manufacturing systems. A significant portion of the coursework involves a group project with industry. This course also serves as the capstone course for the MS MSE degree. Prereq: GRADS—MSE major or consent of instructor; UG—ISE 315 or ISYE 605 and consent of instructor. 10;II;S

643 Performance Analysis of Manufacturing Systems. 3 cr  (Same as ME 643) This course examines the state-of-the-art in the use of stochastic network theory to develop performance models of modern manufacturing systems. Prereq: ISYE 320, 321, 624 or Math 632, CS 302, 367 or equivalent; Grad standing or Consent of Instructor. 14;II;S

650 Labor-Management Relations for Engineers. 3 cr  (Same as Ind Rel 650) Analysis of labor-management relations problems, policies, and procedures of concern to the engineering profession. Prereq: Junior standing in College of Engineering. 10;II;S—Last taught Spring 90
652 **Sociotechnical Systems.** 3 cr  (Same as Psych 652) Sociotechnical systems theory with application to the design of organizations and jobs. Open systems and organizational environments. Analysis of the technical and social systems and techniques for “whole” system consideration. Organizational design strategy. Field site analyses by student teams. Prereq: Graduate standing or ISYE 349. 10;II2;S0

653 **Organization and Job Design.** 3 cr  (Same as Psych 653) Design of productive organizations and people’s roles within them. Issues including boundary location, organizational decision levels, autonomous work groups, implementation and diffusion. Roles of the union. Case studies. Prereq: Graduate standing or ISYE 349. 15;II0;S0

655 **Advanced CAD/CAM.** 3 cr  Focuses on the state-of-the-art in CAD/CAM methodologies and tools for manufacturing applications such as wire-EDM, casting, sheet metal fabrication, rapid prototyping, tool and die making, and cost estimation. Prereq: A course in manufacturing processes, ISYE 605 or equivalent and consent of instructor. 10;II4;S0

658 **Managing Technological Change in Manufacturing Systems.** 3 cr  (Same as OIM 758) Overview of computerized manufacturing technologies and their managerial implications: Manufacturing systems; manufacturing planning and control; integration aspects; performance measures; adoption considerations; human aspects and implementation issues. Prereq: REAL EST 725, ISYE 315 or consent of instructor; students may not take both ISYE 658 & OIM 758 for cr. 15;II0;S0

662 **Design and Human Disability and Aging.** 3 cr  Design of products for persons with physical, sensory, or cognitive impairments is covered as well as the design of standard mass market products. Interdisciplinary teams explore specific disabilities, then design a standard mass market product in competition with each other. Prereq: Junior standing or consent of instructor. 11;II4;S0

663 **Occupational Stress.** 3 cr  This course examines the nature of occupational stress, what it is, how it is measured, its antecedents and its consequences, and its effects on human performance and health. Prereq: ISYE 349, MHR 300, or consent of instructor. 10;II2;S0

671 **E-Business: Technologies, Strategies and Applications.** (Crosslisted with OTM) 1; 3 cr  Overview of core concepts of e-commerce and e-business technologies, strategies and applications. Covers business-to-consumer, business-to-business and intra-business models by using real-world examples and cases from various industries. Significant portion of coursework involves interdisciplinary group project with industry. P: Sr or Grad st.

672 **E-Business Transformation: Design, Analysis and Justification. II.** 3 cr  Analytical and integrative approaches for e-business strategy formulation, analysis and justification and development of implementation roadmap. Emphasizes development of analytical reasoning and managerial thinking through creation of assessment tools and decision aids to guide various aspects of e-business transformation. Prereq: Senior or Grad standing or consent of instructor. 11;II3;S1

691 **Special Topics in Industrial Engineering.** 1-3 cr  Some past offerings based on faculty interests include: Simulation, Systems Design, Computer-Aided Design for Industrial Engineers, Seminar on Human Factors in Office Automation, Hospital Information Systems, Time and Motion Study, Introduction to Decision Analysis, Models for Production Scheduling, Managing Manufacturing Systems, Ergonomics, Improving Quality and Productivity in Organizations, Advanced Production Planning and Control, Computers in Industry, Economic Decision Theory, Occupational Stress. Prereq: Junior standing and consent of instructor. 15;II4;S1

692 **Special Topics in Human Factors. EPICS.** 3 cr  Various special topics in human factors engineering. Course topic may vary from semester to semester. Different versions of this course may be offered in the same semester (e.g., 692(1), 692(2)). Prereq: Consent of Instructor. 11;II3;S1

699 **Advanced Independent Study.** 1-5 cr  A professor may direct individual study by a student on any topic of mutual interest. A student normally initiates request. Prereq: Consent of instructor. 15;II5;S5

702 **Graduate Cooperative Education Program.** 1 cr  Work experience which combines classroom theory with practical knowledge of operations to provide students with a background upon which to base a professional career in industry. Prereq: Graduate standing.

712 **Quality Product and Process Design.** Quality engineering by robust design of products and processes. Development of an integrated system to prepare product/process specifications and to design and produce to these specifications for increased quality and reliability. P:ME/ISYE 512, or cons inst.
**ISyE Faculty**

Our ISyE Faculty represent many diverse interests in a multitude of ISyE applications. Through contact with these professors you may obtain information relating to your career choice, ideas and opinions on graduate schools, and any specific information on a particular ISyE application or tool.

**Alagöz, Oğuzhan**

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Dr. Alagöz's research focuses on solving problems in health-care industry using operations research techniques. More specifically, he is interested in using stochastic optimization methods such as Markov decision processes and simulation to solve the medical decision making problems including optimal treatment planning and economic analysis of health-care policies.

**Bier, Vicki (Chair)**

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Dr. Bier's research concerns the development of methods for analyzing and making decisions about risks. Within that area, she has developed methods for the probabilistic risk analysis of nuclear power plants, and has also studied methods for decision-making regarding security and critical infrastructure protection.

**Brennan, Patricia Flatley**

pjbrennan@engr.wisc.edu; 3270 ME; 263-1315

Dr. Brennan is a nurse and industrial engineer who designs and evaluates computer systems that help patients take better care of themselves. Dr Brennan joined the department fall 1996. Her research focuses on innovative models of nursing care delivery. The concept, innovative models, is broad and includes both computer systems and organizational delivery systems. Dr. Brennan's work is grounded in key themes in nursing, industrial engineering, and health services research with two main components: computer technology for patient care and nursing practice innovations.

**Carayon, Pascale**

carayon@engr.wisc.edu; 3126 ECB; 262-9797

Dr. Carayon is primarily interested in human factors and ergonomics, quality and productivity improvement and technological and organizational change. Dr. Carayon is currently involved with research on patient safety and systems engineering, quality of working life and turnover/retention of the Information Technology workforce, implementation of information technology in small clinics, quality and safety management in the construction industry, and human factors of computer and information system security.

**Ferris, Michael C.**

ferris@cs.wisc.edu; 4381 CompSci/Stats; 262-1204

Dr. Ferris' research is concerned with algorithmic and interface development for large scale problems in mathematical programming, including links to the GAMS and AMPL modeling languages, and general purpose software such as PATH and FATCOP. He has also worked on several applications of both optimization and complementarity, including cancer treatment plan development, radiation therapy, video-on-demand data delivery, economic and traffic equilibria, structural and mechanical engineering.

* Available as an undergraduate advisor.
Krishnamurthy, Ananth*

ananth@engr.wisc.edu; 3258 ME; 890-2236
Dr. Krishnamurthy assumed leadership of the Center for Quick Response Manufacturing in January 2008. He earned his Ph.D. in Industrial Engineering from the University of Wisconsin-Madison under the guidance of Prof. Rajan Suri, founder of the concept and methodology of Quick Response Manufacturing. Krishnamurthy has an M.S. in Manufacturing Systems Engineering, also from UW-Madison, and an undergraduate degree in Mechanical Engineering from the Indian Institute of Technology in Bombay, India.

Li, Jingshan*

jingshan@engr.wisc.edu; 3222 ME; 890-3780
Dr. Li joined the Department of Industrial and Systems Engineering in July 2010 as an associate professor. Previously he worked in University of Kentucky (2006-2010) and General Motors Research & Development Center (2000-2006). He received his PhD in Electrical Engineering - Systems in 2000. His research interests are in analysis, design, control and continuous improvement of production, service and health care systems.

Linderoth, Jeffrey*

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Previously an assistant professor of industrial and systems engineering at Lehigh University, Dr. Linderoth joined the Department of Industrial and Systems Engineering and the Department of Computer Sciences in August as an assistant professor. He earned his PhD in 1998 in industrial and systems engineering from Georgia Tech, completed a postdoctoral fellowship in the Argonne National Laboratory mathematics and computer science division, and was a senior consultant with Axioma Inc. Linderoth’s research interests include numerical optimization, high-performance and grid computing (linear and nonlinear), integer programming, stochastic programming; and applications in finance, logistics and healthcare.

Luedtke, James*

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Dr. Luedtke joined the Department of Industrial and Systems Engineering as an assistant professor in 2008. He earned his PhD in 2007 in industrial and systems engineering from the Georgia Institute of Technology. Then, he worked for a year as a postdoc at the IBM Research T.J. Watson Research Center, Yorktown Heights, New York, where he studied methods for solving large-scale scheduling problems with complex side constraints. Luedtke’s research interests include optimization of complex problems involving uncertainty, discrete decisions, and nonlinear interactions.

* Available as an undergraduate advisor.
Lund, John
john.lund@uwex.edu; 420 Lowell Hall, 610 Langdon Street; 262-9847
Professor, Department Chairperson, School for Workers, Outreach and E-learning Extension

Radwin, Robert G.
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Dr. Radwin's research is concerned with occupational safety and health aspects of hand intensive work, and with enhancing manual performance. His research focuses on causes and prevention of upper extremity work related musculoskeletal disorders. He accomplishes this by developing new methodologies for measuring and quantifying physical stress exposure, including motions, exertions, thermal stress, and vibration. Dr. Radwin's background is multidisciplinary, including degrees in bioengineering and electrical engineering, as well as industrial engineering. Consequently his research employs a multidisciplinary approach, drawing on his diverse background in engineering and the biomedical sciences.

Shi, Leyuan*
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Dr. Shi joined the Department in 1994. Her research interests include large scale optimization and simulation with applications to supply chain optimization, production planning, and scheduling.

Vanderheiden, Gregg C.*
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Dr. Vanderheiden's interests cover a wide range of research areas in technology and human disability and aging. Current research includes development of new interface technologies, models for information transfer for constrained systems, interfaces for elderly users, cross-disability cross-technology mainstream product interfaces, abstract user interfaces, device interconnection and interoperability standards, usability evaluation protocols and tools, web access standards, next generation deaf telecommunication technologies, cross-disability accessible telecollaboration systems, optimized information transmission systems for blind individuals, and modification of operating systems to facilitate user-customizable input and output systems.

Veeramani, Dharmaraj*
raj@engr.wisc.edu; 4101 ME; 262-0861
Dr. Veeramani joined the department in 1992. He has received degrees in both Mechanical and Industrial Engineering. His primary research interests are in e-commerce and e-business, particularly Internet-aided collaborative design, manufacturing and supply web management. Specific topics include e-commerce decision technologies and business models; Dynamic configuration and highly distributed orchestration of supply webs; E-procurement and outsourcing; Quick response in request-for- quotation and order processing; Auction-based management of manufacturing systems and supply webs.
* Available as an undergraduate advisor.
Vernon, Mary K.  
vernon@cs.wisc.edu; 4375 CompSci/Stats; 262-7893  
Dr. Vernon’s research focuses on developing new analytic performance modeling techniques and applying analytic techniques to computer system design issues, with an emphasis on design issues for streaming media content delivery, parallel architectures and systems, complex large-scale parallel/distributed software, and networked systems security and trustworthiness. To date, the modeling techniques she has developed together with graduate students, an undergraduate student, and faculty colleagues include: the Generalized Timed Petri Net (GTPN), Customized Approximate Mean Value Analysis (CMVA), and deterministic task graph analysis, interpolation approximations for evaluating parallel processor scheduling policies, the LoPC model, and models for developing optimized content distribution networks for streaming media. She has used these techniques to explore significant system design issues for parallel system architectures, operating systems, complex parallel/distributed applications, parallel processor scheduling policies, and streaming media systems. Results have led to new architectural proposals, such as new distributed bus arbitration protocols that have been patented by the University of Wisconsin, the first synchronized data prefetch primitive for parallel computers, and recent scalable streaming media protocols that recover lost packets. Current projects include further development of analytic modeling techniques, networked system vulnerability analysis, production parallel/distributed job scheduling, optimized streaming media systems, and near-optimal execution of large distributed adaptive Grid applications.

Wiegmann, Doug  
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Dr. Wiegmann is primarily interested in human factors and system safety. Dr. Wiegmann is currently involved with research on safety and systems engineering, teamwork and communication, and naturalistic decision making within the context of aviation and healthcare. Dr. Wiegmann’s research consists of both laboratory (e.g., flight simulator laboratory) and field settings (e.g., the cardiac surgery operating room).

Wright, Stephen  
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Professor in the Computer Sciences Department at UW-Madison, with a courtesy appointment in Industrial and Systems Engineering Member of the Optimization Group at UW-Madison Chair of the Mathematical Programming Society. Numerical optimization, especially problems involving real (as opposed to integer or discrete) variables. I’m interested in the theory, algorithms, and implementations, and in applications of all types.

Zhou, Shiyu  
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Dr. Zhou’s research interests include data analysis and knowledge discovery for complicated manufacturing processes using sensor fusion, feature extraction, and pattern recognition based on engineering field knowledge for quality and productivity improvement and implementations in various manufacturing processes, such as machining, forging, rolling, micro/meso scale processes, etc.; fast calibration and active compensation for manufacturing systems: active real-time control of manufacturing processes, integration of statistical process control with automatic process control.

Zimmerman, David R.  
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Dr. Zimmerman is a professor emeritus in the Department of Industrial Engineering. His primary research interests long term care quality and health care decision support systems.
Research Facilities
(http://www.engr.wisc.edu/eie/research/facilities/)

Complex Systems Simulation and Optimization Laboratory
Many of key business investment decisions and organization operations are large-scale optimization problems cast as designing underlying dynamic systems, at the least possible cost, to achieve desired service levels. These problems are challenging and are notoriously difficult to solve. Research in this group focuses on: simulation modeling, large-scale optimization, and multi-criteria decision making of such problems. Research projects include: supply chain optimization, advanced planning and scheduling, inventory control, and development of web-enabled optimization technologies.

Comprehensive Health Enhancement Support Systems (CHESS) Laboratory
These laboratories have gone through an exciting period of change. The major focus of the research is the design and testing of expert systems, computer mediated communication and database systems to help people who have problems in the areas such as breast cancer, AIDS, heart disease, alcoholism, aging and abuse. The lab includes nearly 200 microcomputers linked through a network to a central server. It sounds like a lot of computers. However, most are out in the homes of people with these problems in Wisconsin, Massachusetts, Connecticut, British Columbia, Michigan and Minnesota. This is allowing used to carry lots of exciting research on how these technologies can be developed, disseminated and used to make a difference in people’s lives. This lab makes extensive use of tools from Quality engineering such as Quality Function Deployment and Quality Planning. Decision science is also essential for the expert systems.

Discrete Event Systems Laboratory
At some fundamental level, activities as seemingly diverse as building truck engines, manufacturing steel, managing internet messages and designing a submarine can be thought about in the same way. As “Discrete Event Systems (DES),” they can be broken down into a series of individual events whose interactions strongly affect each other. All include difficult-to-predict interactions between people and computers. But all can be improved through careful design. And in spite of their differences, some as-of-yet undiscovered theory probably links them and all other discrete event systems.

DES evolve with the occurrence of discrete events, such as the arrival of a job or the completion of a task. Owing to the complex dynamics resulting from the stochastic interactions of such discrete events over time, modeling, design, and optimization of DES can be difficult tasks. At the same time, since such systems are becoming more widespread as a result of modern technological advances, it is important to have methodologies and tools for design and optimization of these systems.

Research in this group focuses on: modeling, design, and optimization of a variety of DES such as manufacturing systems, computer systems, communication networks and health care systems. We have recently developed an optimization methodology called Nested Partitions Method. The new method can be applied to many practical systems. Research projects using the Nested Partition Method include:

- Optimal resource allocation under uncertainty
- Optimal product design
- Designing repair policy in an avionics repair system
- Scheduling unrelated parallel machines
Ergonomics Analysis and Design Laboratory
Research in the Ergonomics Analysis and Design Laboratory is concerned with the recognition, causes, and control of work-related musculoskeletal disorders and with enhancing performance in manual work. Ergonomics guidelines are being developed for the design and use of manually operated equipment and hand tools. Advanced methods are being developed for measuring and assessing exposure to physical stress in the workplace, including repetitive motion, forceful exertions, contact stress, posture, cold temperatures and vibration. This research makes use of electronic sensors and transducers, instruments, and computers for measuring biomechanical and physiological signals, and for analyzing human responses associated with physical stress, both in the laboratory and the field. Special apparatus are constructed and used for simulating work activities. Signs, symptoms, and deficits associated with cumulative trauma disorders and peripheral neuropathies are investigated involving Clinical Science Center outpatients and faculty workers using in-plant studies.

The lab is equipped with a Biodex dynamic strength testing system, treadmill, an electromagnetic vibration generation and measurement system and a variety of sensors and electronic instruments for measuring biomechanical and physiological data, including force, human motion, EMG, temperature, and ECG. Various microcomputers are available for data acquisition and signal processing and data analysis. A small workshop is maintained for constructing experimental apparatus, calibrating instruments, and assembling experiments. The workshop contains an assortment of tools and electronic instruments including oscilloscopes, multimeters, power supplies, and function generators.

Flexible Manufacturing Cell Undergraduate Teaching Laboratory
The state-of-the-art is exemplified in the industrial engineering department’s flexible manufacturing cell teaching laboratory. The process it supports, from computer design to manufacture and assembly, is completely automated using CAD and CAM systems, a material-handling conveyor and robots, and an assembly rot able to recognize parts with the help of tactile sensors and up to six vision cameras. Advanced coordinate measurement hardware and software allow for quality control and reverse engineering, where an exiting part can be measured and either checked against original design specifications or duplicated through the computer-aided design and manufacturing systems. Such complete integration of technology prepares students not only to keep pace with industry but also to help lead industry in developing world-class manufacturing systems. Students learn all the major steps of manufacturing, from product design to final product assembly and quality inspection. Students also learn to design and manufacture complex three-dimensional shapes such as those required in developing dies for metal and plastic forming processes.

Laboratory for Electronic Commerce Design Technologies
Our research mission is to investigate and design a comprehensive, rigorous, and standard set of theoretical methodologies, computer-integrated technological systems, and organizational processes that will lead to fundamentally new decision-making paradigms and business models for Electronic Commerce and Internet-enabled supply-web interactions in the manufacturing industry. Our research focuses on how manufacturing companies can become more competitive in the global marketplace through the use of Internet/Intranet/Extranet technologies in customer-to-business, intra-business, and business-to-business interactions. Our research is inherently multidisciplinary in nature combining engineering, computer science, and business. We work in close collaboration with a wide variety of manufacturing companies to ensure that the research being conducted is not only rigorous but also of use to industry. Example of ongoing and recently completed projects are:

- Dynamic configuration and highly-distributed orchestration of supply-webs
- Investigation of outsourcing and bid-assembly strategies for supply-web configuration
- TOME: Similarity-based decision-making
- Design and evaluation of multi-attribute bidding strategies
- Rapid and accurate cost estimation methodologies
MacroErgonomic Safety and Health Laboratory
Research in this laboratory is focused on macroergonomics and occupational safety and health in a variety of settings. An assortment of methodologies are used, such as experimental, epidemiological, and qualitative, to study factors that promote occupational safety and health. Areas of application include health care systems, agriculture, and manufacturing.

Manufacturing Systems Analysis Laboratory
Students and faculty perform research on new techniques for modeling and analysis of manufacturing systems, and investigate ways to improve the application of such techniques in industry. The laboratory is equipped with state-of-the-art analysis tools, including spreadsheets, rapid modeling tools, simulation and animation packages. Topics being investigated include: computer models to assist in Quick Response Manufacturing, cost benefits of lead time reduction, queueing and analytical models for Kanban, POLCA and other material control strategies.

Occupational Ergonomics and Biomechanics Laboratory
Research in the Occupational Ergonomics and Biomechanics Laboratory focuses on health aspects of physical stress in the workplace. This work includes prevention and detection of work related musculoskeletal disorders; developing measurement and analytical methods for assessing exposure to physical stress in the workplace; understanding ergonomics aspects of the design, selection, installation and use of manually operated equipment; and quantifying functional deficits associated with musculoskeletal disorders and peripheral neuropathies.

The lab is equipped with a variety of transducers and instruments for measuring human kinetics and kinematics, optical motion analysis, physiological indices and biopotentials. In addition to an electromagnetic vibration generation and measurement system, occupational activities are simulated for conducting research to better understand how to design jobs and equipment in which people play a significant role, so that human capabilities are maximized, physical stress is minimized, and workload is optimized.

Office Automation Laboratory
Activities in this laboratory are aimed at determining optimal applications for office technologies (computer systems, workstations, environmental conditions, software) emphasizing human factors considerations. This lab also studies issues pertaining to worker's health, well-being, performance, productivity, and quality of work life. The effectiveness of various hardware configurations, comparisons of workstation design, and the usability of software are examined in both laboratory and field settings. Photographic and videotaping equipment is used to document worker behavior in simulated or real work settings. On-line, real-time computer systems are used to simulate work activities and evaluate subject performance. Survey research techniques are also used to examine job design and work organization implications of office automation. The laboratory provides a network of microcomputers with specialized software for survey data collection and statistical analysis.

Operations Research Laboratory
Current project areas include several efforts in nonlinear optimization, emphasizing optimization of stochastic systems including systems observable only by simulation.

Sociotechnical Engineering Research Laboratory
The research conducted in the Sociotechnical Engineering Laboratory is concerned with the design and improvement of work systems in various industries to deal with a range of human factors and quality issues. Much of this research consists of field research conducted with various companies and organizations. Examples of research conducted in the Sociotechnical Engineering Laboratory include: (1) study of the implementation of an Electronic Medical Record system in a small clinic; (2) study of the human factors of computer and information security; and (3) study of turnover and retention of women and minorities in Information Technology jobs. The Sociotechnical Engineering Laboratory is equipped with a wireless network and includes various computing equipment.
Stochastic Systems Laboratory
Professor Bier administers the Stochastic Systems Laboratory, which provides office space and needed computer facilities for graduate students working in her research area. Computer facilities located in the Stochastic Systems Laboratory include several PC-compatible computers and software (including word processing, data base, spreadsheet, Monte Carlo simulation, symbolic algebra, statistics, networking, and computer graphics software).

Biomedical Engineering Center
- Promotes engineering research in minimally invasive biomedical technology that results in reduced risk and morbidity, lowered health care costs, faster recovery, less lost time from work and activities, and improved quality of life
- Advances four major objectives: (1) access to treatment sites with minimal harm to healthy tissues, (2) diagnosis of diseases and disorders with minimal exposure to toxic agents, (3) treatment of illnesses by targeting therapies directly to the affected site without acting on unaffected sites, and (4) monitoring physiology and health with minimum affect on the body
- Develops biosensors, biomedical instruments, patient monitoring equipment, and microcomputer-based medical instruments
- Conducts research in molecular engineering and localized drug delivery
- Performs research in radiological engineering and medical imaging; studies biomechanics and the causes, prevention and treatment of musculoskeletal injuries, and develops instruments and devices for arthroscopic and laparoscopic surgery
- Performs research in rehabilitation engineering and design for people with disabilities to easily access technology

Center for Health Systems Research and Analysis
- Develops and evaluates performance measures and decision support systems with health care applications, including long-term care quality assurance, health care cost containment and many other issues.
- Develops health information systems and data bases for use in policy analysis and epidemiologic studies.
- Develops and evaluates decision support and information systems for health education and promotion programs, including the Comprehensive Health Enhancement Support System (CHESS).
- The Center for Health Systems Research and Analysis (CHSRA) conducts research, expanding and applying techniques such as decision theory, measurement, and evaluation, to improve health systems. Employing state-of-the-art technology, CHSRA collects, integrates, analyzes and interprets health information.
- CHSRA was formed in 1973 as a collaborative effort between the departments of Industrial Engineering and Preventive Medicine at the University of Wisconsin. Over the years, CHSRA's interdisciplinary staff has applied these techniques to address a variety of issues in:

  long term care,
  injury prevention,
  maternal and child health,
  mental health,
  dental health and
  health crises.

Center for Human Performance and Risk Analysis
The Center’s mission is to break the chains of events that cause accidents. Some center activities include:
seed grants (center-funded interdisciplinary research on human performance by UW-Madison faculty), annual workshop publicizing center-sponsored research, and quarterly newsletter (The Human Element).
Center for Quality & Productivity Improvement

The mission of the Center is to:

- Conduct innovative practical research on concepts and methods of quality improvement
- Provide a national and international forum for the exchange of ideas among faculty, students, experts, and practitioners from industry, government and academia
- Disseminate research findings and ideas through effective instructional and communication approaches
  In these ways, the Center will contribute to the improved functioning and increased success of organizations of all kinds, and to increased fulfillment of individuals working in those organizations.

Center for Quick Response Manufacturing

Quick Response Manufacturing (QRM) is a company-wide strategy which can cut lead times in all phases of manufacturing. QRM can bring your products more quickly to market and make your firm a formidable competitor. It can secure your business prospects by helping you compete in the new manufacturing arena.

- Quick response will not just make your firm more attractive to potential customers, it will also increase profitability by reducing non value-added time, cutting inventory, and increasing return on investment.
- In the 21st century, the standard of competition is speed of concept, design and production, and speed of delivery. If you can get products to market before the competition, new doors will open for your firm.
- Ultimately, QRM encourages companies to constantly search for ways to squeeze excess time from every system. QRM develops strategies to uncover and eliminate waste and inefficiency across all functional areas. Firms which take advantage of QRM gain market share and help ensure success in the future.
- Benefits of quick response manufacturing include:
  
  - lower manufacturing costs
  - increased market share
  - customer orders filled faster
  - higher quality products
  - rapid introduction of new products
  - find and eliminate waste and inefficiency
  - a secure manufacturing future

Trace Research & Development Center

The Trace Research and Development Center (TDRC) is a College of Engineering research center that focuses on making off-the-shelf technologies and systems like computers, the internet, and information kiosks more accessible for everyone through the process known as universal, or accessible design. Trace is designated, with core funding from the National Institute on Disability and Rehabilitation Research (NIDRR), as the Rehabilitation Engineering Research Center (RERC) on Information Technology access, one of fifteen such centers throughout the country—each focused on a different topic area. Trace is also a partner in the RERC on Telecommunications, along with Gallaudet University.

The Trace Center has been widely regarded for many years as the leading research, development, and resource center in the area of access to computers by people with disabilities. Over the last several years, the Trace Center has also become well recognized for its work in disability access and universal design of the world wide web, information transaction machines, and telecommunications.

The scope of this RERC covers access by individuals with all types, degrees, and combinations of disabilities to a wide range of technologies, including computers, ATMs, kiosks, fare machines, point-of-scale devices and smartcards, home and pocket information appliances, internet technologies (XML, XSL, CSS,SMIL, SVG, etc.), intranets, and 3-D and immersive environments.

The Center focuses on the use of targeted projects and collaboration, both national and international, to carry out its research, development, information dissemination, training, and standard-setting activities.
ADDITIONAL USEFUL WEBSITES

Academic Calendar http://www.secfac.wisc.edu/acadcal/
Adult and Student Services http://www.dcs.wisc.edu/info/
Associated Students of Madison http://www.asm.wisc.edu/
Bursar’s Office http://www.bussvc.wisc.edu/bursar/bursar.html
Campus Safety http://www.safeu.wisc.edu/
Child Care and Family Resources http://occf.wisc.edu/
Code of Conduct http://students.wisc.edu/saja/misconduct/misconduct.html
College of Engineering Student Services http://studentservices engr.wisc.edu/
Commencement http://www.secfac.wisc.edu/comMence/
Computer-Aided Engineering http://www.caе.wisc.edu/
Course Guide http://public.my.wisc.edu/portal/rend er.usrLayoutRootNode.uP
Information Technology, Division of http://www.doit.wisc.edu/
Innovation Days http://innovation.wisc.edu/
International Student Services http://iss.wisc.edu/
Job Center, UW Student http://jobcenter.wisc.edu/
LGBT Campus Center http://lgbt.wisc.edu/
Morgridge Center for Public Service http://www.morgridge.wisc.edu/index.html
Multicultural Student Center http://msc.wisc.edu/misc/
New-Student Programs http://www.newstudent.wisc.edu/
Recreational Sports, Division of http://www.recspor ts.wisc.edu/
Registrar, Office of the http://www.registrar.wisc.edu/
SAFE Nighttime Services http://www2.fpm.wisc.edu/trans/Safeservices.asp
Schedule of Classes http://registrar.wisc.edu/schedule_of_classes.htm
Software Training for Students http://www.doit. wisc.edu/training/student/
Steuber Prize for Excellence in Writing http://tc. engr. wisc.edu/steuber/
Student Advocacy and Judicial Affairs http://students.wisc.edu/saja/index.html
Student Financial Aid, Office of http://www. finaid.wisc.edu/
Student Health Insurance Plan http://www.uhs.wisc.edu/hoMe.jsp?cat_id=116
Student Life, Division of http://students.wisc.edu/
Student Shop, College of Engineering http://coestudentshop. engr. wisc.edu/
Transfer Student Services http://www.newstudent. wisc.edu/transfer/
Transportation Services http://www2.fpm. wisc.edu/tra ns/
Undergraduate Catalog http://pubs. wisc. edu/ug/
University Apartments http://www.housing. wisc.edu/universityapartMents/
University Housing http://www.housing. wisc.edu/
University Police Department http://www.uwpd. wisc.edu/
Veteran Services http://students. wisc.edu/veterans/veterans.html
Visitor and Information Programs http://www.vip. wisc.edu/
Wendt Library http://wendt.library. wisc.edu/
Wisconsin Experience http://www.learning. wisc.edu/
Wisconsin Union http://www.union. wisc.edu/