INDUSTRIAL ENGINEERING: HUMAN FACTORS AND HEALTH SYSTEMS ENGINEERING, M.S.

This is a named option within the Industrial and Systems Engineering M.S. (http://guide.wisc.edu/graduate/industrial-systems-engineering/industrial-engineering-ms)

By examining, designing, testing and evaluating products, environments and how people interact in it, Human Factors and Health Systems Engineering (https://www.engr.wisc.edu/app/uploads/2017/02/HFHSE-web-1.pdf) professionals can create productive, safe and satisfying environments for humans, and apply industrial and systems engineering tools and approaches to specific health care problems.

IS THIS PROGRAM RIGHT FOR YOU?

The demand for engineers who can combine a concern for the human component with traditional engineering principles is great. The Human Factors and Health Systems Engineering program provides students content from physical ergonomics, cognitive ergonomics, macroergonomics and broad issues in health care, including long-term care, prevention, quality improvement, health care financing, and system evaluation.

This program considers human reliability, psychomotor capabilities and human characteristics in equipment. As an important aspect of equipment design is human-computer interaction. Engineers are concerned with the complex physical relationships between people, machines, job demands and work methods, design, work quality and assessment of skill. Also important are organizational issues such as management approaches, job design, participative problem solving, psychological stress, job satisfaction, performance effectiveness, product/service quality, and quality of work life.

Effective model building requires strong systems analysis skills. While skill in manipulating statistical and mathematical models is essential to an industrial engineer’s success, the health systems engineer must also be able to initiate resolutions to strategic problems using knowledge of how organizational decisions are made.

WHAT YOU LEARN

- Articulates, critiques, or elaborates the theories, research methods, and approaches to inquiry or schools of practice in industrial and systems engineering including areas such as decision science and operations research, quality engineering, manufacturing and health systems, and/or human factors.
- Identifies sources and assembles evidence pertaining to questions or challenges in industrial and systems engineering.
- Selects and/or utilizes the most appropriate industrial and systems engineering methodologies and practices.
- Evaluates or synthesizes information pertaining to questions or challenges in industrial and systems engineering.
- Communicates clearly in ways appropriate to industrial and systems engineering.

If questions, please contact COE Grad Admissions at ilegradadmission@engr.wisc.edu; Subject Line: IE Grad Admissions and ISyE Seniors please contact Pam Peterson, prpeterson@wisc.edu, with any questions. Please see admission requirements under the Apply Now tab below.

ADMISSIONS

APPLICATION DEADLINES

- **Fall 2018**: January 1 (*Non-UW IE students can only apply for fall semester).
- **Spring Admission**: October 1 (ONLY UW–Madison IE seniors are eligible for spring admission).

ADMISSION

Applicants must first meet all of the requirements of the Graduate School (https://grad.wisc.edu/admissions/requirements).

- Applicants must also meet department specific requirements as outlined below:
  - B.S. degree in industrial engineering or related area or equivalent
  - Non-native English speakers must have a Test of English as a Foreign Language (TOEFL) score of 580 (written), 243 (computer-based test), or 92 (Internet version).
  - The Graduate Record Examination (GRE) is *required for all masters programs in ISyE*. Information on taking the GRE exam can be found here (https://www.ets.org/gre). Please note: Applicants should plan to take their exam by December 1 to allow scores to be sent and processed.

*ISyE undergrads and applicants with prior institutional approval are waived from the GRE requirement.

HOW TO APPLY:

1. Fill out an online application (https://apply.grad.wisc.edu/Account/Login?ReturnUrl=%2f) through the Graduate School website and pay the application fee (https://grad.wisc.edu/admissions/faq).
2. Include three recommendation letters and the recommenders’ contact information as part of the online application*. An email will be sent to the recommender, asking that they submit their letter online using the Graduate School's recommendation form. Applicants can log back into their online application to resend the email request if the recommender loses the email. Letters of recommendation must be submitted electronically.
3. Submit a Statement of Purpose (https://grad.wisc.edu/prospective/prepare/statement) with your online application.
4. GRE Exam Information (https://www.ets.org/gre) (STARTING FALL 2018): The course-only option does require the GRE exam be taken by prospective students as part of the application but note there are no specific scoring guidelines for the exam as the GRE is only one part of consideration for admission into the program. Please note: Applicants should plan to take their exam by Dec. 1st to allow scores to be sent and processed.
5. TOEFL Exam Information: Ask ETS (http://www.ets.org) to submit your TOEFL scores to the UW–Madison Graduate School (Institution Number 1846). If you have your scores sent to UW–Madison, they will be available online to all departments to which you have applied. The institution code, therefore, is the only number needed. For more information please visit the Graduate School Requirements (https://
policies and processes related to funding. Be sure to check with your program for individual funding information. Assistantships, fellowships, traineeships, and financial aid. Further resources to help you afford graduate study might include GRADUATE SCHOOL RESOURCES (https://grad.wisc.edu/admissions).

GRADUATE SCHOOL ADMISSIONS
Graduate admissions is a two-step process between academic degree programs and the Graduate School. Applicants must meet requirements of both the program(s) and the Graduate School. Applicants must meet requirements for admission and if you feel you meet the necessary criteria for applying, please do so.

QUESTIONS?
Check out the Admissions FAQ (https://grad.wisc.edu/admissions/faq) or contact us, iegradadmission@engr.wisc.edu.

GRADUATE SCHOOL ADMISSIONS
Graduate admissions is a two-step process between academic degree programs and the Graduate School. Applicants must meet requirements of both the program(s) and the Graduate School. Once you have researched the program(s) you are interested in, apply online (https://grad.wisc.edu/admissions).

FUNDING
Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding) is available from the Graduate School. Be sure to check with your program for individual policies and processes related to funding.

FOR UW STUDENTS ONLY
1. UW IE undergrads no longer need to submit a separate paper application—only the online application is required with a statement of purpose.
2. Three letters of recommendation are NOT required for students completing their ISyE bachelor's degree at UW. Please note that the application system will still require you to list three individuals as recommenders. You are welcome to list Jim Luedtke, Pam Peterson, and Maria Zarzalejo to bypass this requirement.
3. ISyE undergrads and applicants with prior institutional approval are waived from the GRE requirement.
4. UW–Madison undergraduate students applying to this program do not need to submit a UW transcript.

NOTE: PLEASE DO NOT SEND DOCUMENTS TO THE GRADUATE SCHOOL. ALL DOCUMENTS SHOULD BE UPLOADED WITH YOUR APPLICATION.

*Application deadlines are strictly enforced and ALL application materials including transcripts, letters and TOFL scores MUST be included and submitted by the application deadline. Please note our office does not provide feedback to applicants as to their potential for admission – please review both the ISyE department and Graduate School requirements for admission and if you feel you meet the necessary criteria for applying, please do so.

MODE OF INSTRUCTION

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Mode of Instruction Definitions

**Evening/Weekend**: These programs are offered in an evening and/or weekend format to accommodate working schedules. Enjoy the advantages of on-campus courses and personal connections, while keeping your day job. For more information about the meeting schedule of a specific program, contact the program.

**Online**: These programs are offered primarily online. Many available online programs can be completed almost entirely online with all online programs offering at least 50 percent or more of the program work online. Some online programs have an on-campus component that is often designed to accommodate working schedules.

**Hybrid**: These programs have innovative curricula that combine on-campus and online formats. Most hybrid programs are completed on-campus with a partial or completely online semester. For more information about the hybrid schedule of a specific program, contact the program.

**Accelerated**: These on-campus programs are offered in an accelerated format that allows you to complete your program in a condensed time-frame. Enjoy the advantages of on-campus courses with minimal disruption to your career. For more information about the accelerated nature of a specific program, contact the program.

CURRICULAR REQUIREMENTS

Minimum 30 credits

Credit

Requirement
Minimum Residence Credit Requirement: 16 credits

Minimum Graduate Coursework Requirement: Half of degree coursework (15 credits out of 30 total credits) must be completed graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university’s Course Guide (https://registrar.wisc.edu/course-guide/).

Overall Graduate GPA Requirement: 3.00 GPA required.

Other Grade Requirements: Grades of C and D received by a candidate in any graduate course will not be counted as credit toward the degree. These grades will be counted in the graduate GPA.

Assessments and Examinations: None.

Language Requirements: No language requirements.

REQUIRED COURSES

Below is a typical curriculum for those pursuing an M.S. in Industrial Engineering with a named option in Human Factors and Health Systems Engineering. Please note the Human Factors and Health Systems Engineering program is a customizable program and students should work out other course options with their faculty advisor.

Fall Potential Courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I SY E 313</td>
<td>Engineering Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/PSYCH 349</td>
<td>Introduction to Human Factors</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 417</td>
<td>Health Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/PSYCH 653</td>
<td>Organization and Job Design</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 601</td>
<td>Special Topics in Industrial Engineering</td>
<td>1-3</td>
</tr>
</tbody>
</table>

Spring Potential Courses:

<table>
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<th>Title</th>
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</tr>
</thead>
<tbody>
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<td>3</td>
</tr>
<tr>
<td>I SY E/PSYCH 349</td>
<td>Introduction to Human Factors</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 417</td>
<td>Health Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 555</td>
<td>Human Performance and Accident Causation</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/MED PHYS 559</td>
<td>Patient Safety and Error Reduction in Healthcare</td>
<td>2</td>
</tr>
<tr>
<td>I SY E/B M E 564</td>
<td>Occupational Ergonomics and Biomechanics</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 575</td>
<td>Introduction to Quality Engineering</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 601</td>
<td>Special Topics in Industrial Engineering</td>
<td>1-3</td>
</tr>
<tr>
<td>I SY E/PHARMACY 608</td>
<td>Safety and Quality in the Medication Use System</td>
<td>3</td>
</tr>
</tbody>
</table>

Summer Potential Courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I SY E 313</td>
<td>Engineering Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/PSYCH 349</td>
<td>Introduction to Human Factors</td>
<td>3</td>
</tr>
</tbody>
</table>

Other Department Course Suggestions:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURSING 761</td>
<td>Health Program Planning, Evaluation, and Quality Improvement</td>
<td>3</td>
</tr>
<tr>
<td>POP HLTH/SOC 797</td>
<td>Introduction to Epidemiology</td>
<td>3</td>
</tr>
<tr>
<td>POP HLTH/ I SY E 875</td>
<td>Cost Effectiveness Analysis in Health and Healthcare</td>
<td>3</td>
</tr>
<tr>
<td>POP HLTH 876</td>
<td>Measuring Health Outcomes</td>
<td>3</td>
</tr>
<tr>
<td>OTM 753</td>
<td>Healthcare Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>B M I 773</td>
<td>Clinical Research Informatics</td>
<td>3</td>
</tr>
<tr>
<td>B M I/COMP SCI 576</td>
<td>Introduction to Bioinformatics</td>
<td>3</td>
</tr>
<tr>
<td>B M I/COMP SCI 776</td>
<td>Advanced Bioinformatics</td>
<td>3</td>
</tr>
</tbody>
</table>

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

NAMED OPTION-SPECIFIC POLICIES

GRADUATE PROGRAM HANDBOOK

The Graduate Program Handbook (https://www.engr.wisc.edu/app/uploads/2016/02/ISYE_New_Grad_Handbook-4.pdf) is the repository for all of the program's policies and requirements.

PRIOR COURSEWORK

Graduate Work from Other Institutions

With program approval, students are allowed to count no more than 9 credits of graduate course work from other institutions.

UW–Madison Undergraduate

UW-Madison students completing their bachelor's degree in the Industrial and Systems Engineering department may count up to 6 credits of coursework numbered 300 or above toward the degree with prior program approval.

UW–Madison University Special

Allowed up to 15 credits numbered 300 or above toward graduate residence credit requirement and graduate degree credit requirement. If the courses were numbered 700 or above they may count toward the minimum graduate coursework (50%) requirement. Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements.

PROBATION

The Graduate School regularly reviews the record of any student who earned grades of BC, C, D, F, or Incomplete in a graduate course
(300 or above), or grade of U in research credits. This review could result in academic probation with a hold on future enrollment or in being suspended from the Graduate School.

**ADVISOR / COMMITTEE**

Per Graduate School policy, every graduate student MUST have a faculty advisor. A faculty advisor provides the graduate student with academic guidance regarding their course selection and research oversight in their thesis or project. Graduate students should always seek advice from their advisor and other faculty in their interest area prior to enrolling for courses.

When graduate students are admitted to the I Sy E department, their advisor is either (a) the faculty person providing financial support, (b) the faculty who recommended their admission, or (c) a faculty is assigned to them by the student services coordinator. Advisors are assigned according to a student’s chosen Focus Area.

A committee often accomplishes advising for the students in the early stages of their studies.

**CREDITS PER TERM ALLOWED**

Enrollment of 12 credits is highly recommended.

**TIME CONSTRAINTS**

Complete in one calendar year: fall, spring and summer.

Master’s degree students who have been absent for five or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements; that coursework may not count toward Graduate School credit requirements.

**OTHER**


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**PROFESSIONAL DEVELOPMENT**

**GRADUATE SCHOOL RESOURCES**

Take advantage of the Graduate School’s professional development resources (https://grad.wisc.edu/pd) to build skills, thrive academically, and launch your career.

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**PEOPLE**

Faculty Directory

**FACULTY**

**PROFESSORS**

- Oguzhan Alagoz (https://directory. engr.wisc.edu/ie/Faculty/Alagoz_Oguzhan)
- Vicki Bier (https://directory. engr.wisc.edu/ie/Faculty/Bier_Vicki)
- Pascale Carayon (https://directory. engr.wisc.edu/ie/Faculty/Carayon_Pascale)
- Ananth Krishnamurthy (https://directory. engr.wisc.edu/ie/Faculty/Krishnamurthy_Ananth)
- John Lee (https://directory. engr.wisc.edu/ie/Faculty/Lee_John)
- Jingshan Li (https://directory. engr.wisc.edu/ie/Faculty/Li_Jingshan)
- Jeff Linderoth (https://directory. engr.wisc.edu/ie/Faculty/Linderoth_Jeffrey) (Department Chair)
- Robert Radwin (https://directory. engr.wisc.edu/ie/Faculty/Radwin_Robert)
- Leyuan Shi (https://directory. engr.wisc.edu/ie/Faculty/Shi_Leyuan)
- Raj Veeramani (https://directory. engr.wisc.edu/ie/Faculty/Veeramani_Raj)
- Shiyu Zhou (https://directory. engr.wisc.edu/ie/Faculty/Zhou_Shiyu)

**ASSOCIATE PROFESSORS**

- Laura Albert (https://directory. engr.wisc.edu/ie/Faculty/Albert-mclay_Laura)
- Jim Luedtke (https://directory. engr.wisc.edu/ie/Faculty/Luedtke_James)
- Doug Wiegmann (https://directory. engr.wisc.edu/ie/Faculty/Wiegmann_Douglas)

**ASSISTANT PROFESSORS**

- Alberto Del Pia (https://directory. engr.wisc.edu/ie/Faculty/Delpia_Alcantara)
- Kaibo Liu (https://directory. engr.wisc.edu/ie/Faculty/Liu_Kaibo)
- Carla Michini (https://directory. engr.wisc.edu/ie/Faculty/Michini_Carla)
- Xin Wang (https://directory. engr.wisc.edu/ie/Faculty/Wang_Xin)
- Nicole Werner (https://directory. engr.wisc.edu/ie/Faculty/Werner_Nicole)
- Gabriel Zayas-Caban (https://directory. engr.wisc.edu/ie/Faculty/Zayas-caban_Gabriel)

**AFFILIATE FACULTY**

- Barbara Bowers (https://directory. engr.wisc.edu/ie/Faculty/Bowers_Barbara)
- Elizabeth S. Burnside (https://directory. engr.wisc.edu/ie/Faculty/Burnside_Elizabeth)
- Molly Carnes (https://directory. engr.wisc.edu/ie/Faculty/Carnes_Mary)
- Peter Chien (https://directory. engr.wisc.edu/ie/Faculty/Chien_Peter)
- Gregory DeCroix (https://directory. engr.wisc.edu/ie/Faculty/Decroix_Gregory)
- Michael Ferris (https://directory. engr.wisc.edu/ie/Faculty/Ferris_Michael)
- Caprice Greenberg (https://directory. engr.wisc.edu/ie/Faculty/Greenberg_Caprice)
- Po-ling Loh (https://directory. engr.wisc.edu/ece/Faculty/Loh_Po-ling)
- Eneida Mendonca (https://directory. engr.wisc.edu/ie/Faculty/Mendonca_Eneida)
- Bilge Mutlu (https://directory. engr.wisc.edu/ie/Faculty/Mutlu_Bilge)
- David Noyce (https://directory. engr.wisc.edu/ce/Faculty/Noyce_David)
- Kevin Ponto (https://directory. engr.wisc.edu/ie/Faculty/Ponto_Keith)
- Carla Pugh (https://directory. engr.wisc.edu/ie/Faculty/Pugh_Carla)
- Andrew Quanbeck (https://directory. engr.wisc.edu/ie/Faculty/Quanbeck_Andrew)
• Thomas Rutherford (https://directory.engr.wisc.edu/ie/Faculty/Rutherford_Thomas)
• Nasia Safdar (https://directory.engr.wisc.edu/ie/Faculty/Safdar_Nasia)
• Mary Elizabeth Sesto (https://directory.engr.wisc.edu/bme/Faculty/Sesto_Mary)
• Dhavan V. Shah (https://directory.engr.wisc.edu/ie/Faculty/Shah_Dhavan)
• Maureen A. Smith (https://directory.engr.wisc.edu/ie/Faculty/Smith_Maureen)
• Linsey Steege (https://directory.engr.wisc.edu/ie/Faculty/Steege_Linsey)
• Bruce R. Thomadsen (https://directory.engr.wisc.edu/bme/Faculty/Thomadsen_Bruce)
• David J. Vanness (https://directory.engr.wisc.edu/ie/Faculty/Vanness_David)
• Rebecca Willett (https://directory.engr.wisc.edu/ece/Faculty/Willett_Rebecca)
• Stephen J. Wright (https://directory.engr.wisc.edu/ie/Faculty/Wright_Stephen)
• Victor Zavala (https://directory.engr.wisc.edu/che/Faculty/Zavala_Victor)

EMERITUS PROFESSORS
• John G. Bollinger (https://directory.engr.wisc.edu/ie/Faculty/Bollinger_John)
• Patricia Brennan (https://directory.engr.wisc.edu/ie/Faculty/Brennan_Patricia)
• Dennis G. Fryback (https://directory.engr.wisc.edu/ie/Faculty/Fryback_Dennis)
• David Gustafson (https://directory.engr.wisc.edu/ie/Faculty/Gustafson_David)
• William G. Reddan (https://directory.engr.wisc.edu/ie/Faculty/Reddan_William)
• Stephen M. Robinson (https://directory.engr.wisc.edu/ie/Faculty/Robinson_Stephen)
• Jerry L. Sanders (https://directory.engr.wisc.edu/ie/Faculty/Sanders_Jerry)
• Michael J. Smith (https://directory.engr.wisc.edu/ie/Faculty/Smith_Michael)
• Harold J. Steudel (https://directory.engr.wisc.edu/ie/Faculty/Steudel_Harold)
• Rajan Suri (https://directory.engr.wisc.edu/ie/Faculty/Suri_Rajan)
• Arne Thesen (https://directory.engr.wisc.edu/ie/Faculty/Thesen_Arne)
• Gregg Vanderheiden (https://directory.engr.wisc.edu/ie/Faculty/Vanderheiden_Gregg)
• David R. Zimmerman (https://directory.engr.wisc.edu/ie/Faculty/Zimmerman_David)