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

This is a named option course-based program 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. 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 iegradadmision@engr.wisc.edu; Subject Line: IE Grad Admissions and I Sy E Seniors please contact Pam Peterson, prpeterson@wisc.edu, with any questions. Please see admission requirements under the Apply Now tab below.

**ADMISSIONS**

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program’s website. Graduate admissions is a two-step process between academic programs and the Graduate School. Applicants must meet the minimum requirements (https://grad.wisc.edu/apply/requirements) of the Graduate School as well as the program(s).

Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/apply).

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Deadline</td>
<td>December 15</td>
</tr>
<tr>
<td>Spring Deadline</td>
<td>October 1</td>
</tr>
<tr>
<td>Summer Deadline</td>
<td>The program does not admit in the summer.</td>
</tr>
<tr>
<td>GRE (Graduate Record Examinations)</td>
<td>Required.*</td>
</tr>
<tr>
<td>English Proficiency Test</td>
<td>Every applicant whose native language is not English or whose undergraduate instruction was not in English must provide an English proficiency test score and meet the Graduate School minimum requirements (<a href="https://grad.wisc.edu/apply/requirements/#english-proficiency">https://grad.wisc.edu/apply/requirements/#english-proficiency</a>).</td>
</tr>
<tr>
<td>Other Test(s) (e.g., GMAT, MCAT)</td>
<td>n/a</td>
</tr>
<tr>
<td>Letters of Recommendation Required</td>
<td>3</td>
</tr>
<tr>
<td>* UW-Madison Industrial Engineering undergrads and applicants with prior institutional approval are waived from the GRE requirement.</td>
<td></td>
</tr>
</tbody>
</table>

**APPLICATION DEADLINES**

- **Fall:** Dec. 15th
- **Spring:** Oct. 1st

**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:
  - BS degree in engineering or related area or equivalent
  - Mathematical Statistics Course (for example, STAT 312 Introduction to Theory and Methods of Mathematical Statistics II)
  - 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 this masters programs in I Sy E. 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.

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

FOR UW STUDENTS ONLY
1. UW–Madison undergraduate students applying to this program must submit a UW transcript, but it may be an unofficial transcript.
2. UW–Madison undergraduate students applying to this program may count 6 approved credits towards their Masters of Science in Industrial Engineering.

*If they were taken within 5 years of admission post a student’s UW bachelor’s degree program finish per Graduate School policy
https://grad.wisc.edu/documents/prior-coursework/

**Coursework earned five or more years prior to admission to a master’s degree or coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

FOR UW ISyE STUDENTS ONLY
1. 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.
2. 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): 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 the 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 the 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://grad.wisc.edu/admissions/requirements) page. Please note: Exam information must be valid at the start date of the semester that you are applying for (nonexpired).

6. Electronically submit one copy of your official transcript with your application. Unofficial copies of transcripts will be accepted for review but official copies are required for admitted students.

Apply now (https://grad.wisc.edu/admissions)

NOTE: PLEASE DO NOT SEND MATERIALS/DOCUMENTS TO THE ISyE DEPARTMENT OR GRADUATE SCHOOL UNTIL YOU ARE RECOMMENDED FOR ADMISSIONS. ALL DOCUMENTS SHOULD BE UPLOADED WITH YOUR APPLICATION.

*Application deadlines are strictly enforced and ALL application materials including transcripts, letters and TOEFL 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.

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

FUNDING

GRADUATE SCHOOL RESOURCES
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.

PROGRAM RESOURCES

Financial assistance, such as TA, PA, or RA positions from the university or the department is not recommended given the accelerated structure and timeline of the program.

If you would like to pursue funding on your own, the following sites could be helpful:

• Graduate School Funding Resources (https://grad.wisc.edu/studentfunding/prospective)
• Graduate School Costs and Funding (https://grad.wisc.edu/studentfunding/currentstudents)
• Tuition & Fees (https://registrar.wisc.edu/tuition_losses.htm)

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/policiesandrequirementstext), in addition to the program requirements listed below.
at the graduate level, at least 18 credits must be in the Industrial and higher, at most 6 credits may be at the 300 level, at least 15 must be

**REQUIRED COURSES**

As stated above, of the required credits, all must be at the 300 level or higher, at most 6 credits may be at the 300 level, at least 15 must be at the graduate level, at least 18 credits must be in the Industrial and Systems Engineering Department, and at least 16 credits must be taken as a graduate student in residence at UW-Madison.

Below is a typical curriculum for those pursuing an M.S. in Industrial Engineering with the course options 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 COURSE PLANNING GRID** (HTTPS://WWW.ENGRA.WISC.EDU/APP/UPLOADS/2016/02/MSIE-NAMED-OPTION-HFSE-SPRING-2018-UPDATE.PDF)

**SPRING COURSE PLANNING GRID**
I SY E 516  Introduction to Decision Analysis  3
I SY E 575  Introduction to Quality Engineering  3
I SY E 601  Special Topics in Industrial Engineering  1-3
I SY E 699  Advanced Independent Study  1-5
I SY E 702  Graduate Cooperative Education Program  1-2

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 785</td>
<td>Health Systems, Management, and Policy</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 451</td>
<td>Service Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>OTM 753</td>
<td>Healthcare Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>OTM 770</td>
<td>Sustainable Approaches to System Improvement</td>
<td>4</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>
<tr>
<td>COMP SCI/ ED PSYCH/ PSYCH 770</td>
<td>Human-Computer Interaction</td>
<td>3</td>
</tr>
<tr>
<td>E M A 601</td>
<td>Special Topics in Engineering Mechanics</td>
<td>1-3</td>
</tr>
<tr>
<td>M H R 412</td>
<td>Management Consulting</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/ISY_E_New_Grad_Handbook-12.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 coursework from other institutions. Coursework earned five or more years prior to admission to a master’s degree is not allowed to satisfy requirements.

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. Coursework earned five or more years prior to admission to a master’s degree is not allowed to satisfy requirements.

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.

CREDITS PER TERM ALLOWED

Enrollment of 12 credits is highly recommended.

TIME CONSTRAINTS

12-16 month program: Students may finish in a 12-month timeline by enrolling in the summer session. If a student wishes to complete a summer internship, a student may finish their degree in an additional Fall semester. However, the program must be completed within 16 months.

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

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.

PROGRAM RESOURCES

THE INDIVIDUAL DEVELOPMENT PLAN (HTTPS://GRAD.WISC.EDU/PD/IDP)
An Individual Development Plan helps with self-assessment, planning, and communication:

• An IDP can help you communicate your professional development and career planning needs and intentions to others including your mentor, which can lead to helpful advice and resources.
• You can use the IDP to make sure you and your mentor’s expectations are clearly outlined and in agreement so that there are no big surprises, particularly at the end of your training.
• The current job market is challenging and research has shown that individuals who perform structured career planning achieve greater career success and satisfaction.

The onus to engage in the IDP process is on you – although your mentor, PI, or others may encourage and support you in doing so. The IDP itself remains private to you, and you choose which parts to share with which mentors. Through the IDP process, you may decide to identify various mentors to whom you can go for expertise and advice.

ENGINEERING CAREER SERVICES (HTTPS://ECS.WISC.EDU)
Julie Rae, Assistant Director for Graduate Student Career Services

GRADUATE students in all Engineering programs

• Resumes & Cover Letters https://ecs.wisc.edu/students/resumes-and-cover-letters/
• Job Search Strategies
• Job Offers & Negotiation https://ecs.wisc.edu/students/offers-and-negotiation/
• CPT for Graduate Students https://ecs.wisc.edu/students/co-op-and-internship/
• Student appointments: Click here (http://go.wisc.edu/ecs-grad-appt) to schedule an appointment with ECS.


UW WRITING CENTER (HTTP://WRITING.WISC.EDU)
Location: 6171 Helen C. White Hall
Tel: (608) 263-1992

The UW Writing Center provides free of charge face-to-face and online consultations that 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 on their own in order to become a better, more confident writer.

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_Alberto)
• 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/cee/Faculty/Noyce_David)
• Kevin Ponto (https://directory.engr.wisc.edu/ie/Faculty/Ponto_Kevin)
• Carla Pugh (https://directory.engr.wisc.edu/ie/Faculty/Pugh_Carla)
• Andrew Quanbeck (https://directory.engr.wisc.edu/ie/Faculty/Quanbeck_Arrow)
• 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)