

INDUSTRIAL ENGINEERING - 5-YEAR BACHELOR OF SCIENCE AND MASTER OF PUBLIC HEALTH IN OCCUPATIONAL SAFETY AND HEALTH

The National Science Foundation (NSF) Engineering Research Center (ERC) on Precise Advanced Technologies and Health Systems for Underserved Populations (PATHS-UP), has a goal of addressing the grand challenge of overcoming the human and economic burden of diabetes and heart disease in underserved communities. The proposed combined program, BS in Industrial Engineering and MPH in Occupational Safety and Health, helps satisfy the need for engineers with formal education in health to bolster the quality of life to the public in underserved areas. In particular, our engineers will be immersed in the practical health related issues prevalent in these areas and help engineer technologies that can overcome the barriers usually faced by point-of-care devices. A second goal of the PATHS-UP program is to recruit and educate a diverse group of scientists and engineers who will lead the future in developing enabling technologies to improve health in underserved communities. This combined program is targeted at accomplishing this second goal, thus enabling the first.

Program Requirements

The freshman year is identical for degrees in aerospace engineering, architectural engineering, civil engineering, computer engineering, computer science, electrical engineering, electronic systems engineering technology, environmental engineering, industrial distribution, industrial engineering, interdisciplinary engineering, manufacturing and mechanical engineering technology, mechanical engineering, multidisciplinary engineering technology, nuclear engineering, ocean engineering, and petroleum engineering (Note: not all programs listed are offered in Qatar). The freshman year is slightly different for chemical engineering, biomedical engineering and materials science and engineering degrees in that students take CHEM 119 or CHEM 107/CHEM 117 and CHEM 120.

Students pursuing degrees in biological and agricultural engineering should refer to the specific curriculum for this major. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met.

First Year

| Fall | | Semester Credit Hours |
|-------------------------|--------------------------------------------------------------------------------------|-----------------------|
| CHEM 107 | General Chemistry for Engineering Students ^{1,4} | 3 |
| CHEM 117 | General Chemistry for Engineering Students Laboratory ^{1,4} | 1 |
| ENGL 103 or ENGL 104 | Introduction to Rhetoric and Composition ¹ or Composition and Rhetoric | 3 |
| ENGR 102 | Engineering Lab I - Computation ¹ | 2 |

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| MATH 151 | Engineering Mathematics I ^{1,2} | 4 |
| University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/) ³ | | 3 |
| Semester Credit Hours | | 16 |
| Spring | | |
| ENGR 216/ PHYS 216 | Experimental Physics and Engineering Lab II - Mechanics ¹ | 2 |
| MATH 152 | Engineering Mathematics II ¹ | 4 |
| PHYS 206 | Newtonian Mechanics for Engineering and Science ¹ | 3 |
| University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/) ³ | | 3 |
| Select one of the following: | | 3-4 |
| CHEM 120 | Fundamentals of Chemistry II ^{1,4} | |
| University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/) ^{3,5} | | |
| Semester Credit Hours | | 15-16 |
| Total Semester Credit Hours | | 31-32 |

¹ A grade of C or better is required.

² Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.

³ Of the 21 hours shown as University Core Curriculum electives, 3 must be from creative arts (see AREN curriculum for more information), 3 from social and behavioral sciences (see IDIS curriculum for more information), 3 from language, philosophy and culture (see CVEN, EVEN and PETE curriculum for more information), 6 from American history and 6 from government/political science. The required 3 hours of international and cultural diversity and 3 hours of cultural discourse may be met by courses satisfying the creative arts, social and behavioral sciences, language, philosophy and culture, and American history requirements if they are also on the approved list of international and cultural diversity (<http://catalog.tamu.edu/undergraduate/general-information/degree-information/international-cultural-diversity-requirements/>) courses and cultural discourse (<http://catalog.tamu.edu/undergraduate/general-information/degree-information/cultural-discourse-requirements/>) courses.

⁴ BMEN, CHEN and MSEN require 8 hours of fundamentals of chemistry which are satisfied with CHEM 119 or CHEM 107/CHEM 117 and CHEM 120; Students with an interest in BMEN, CHEN and MSEN can take CHEM 120 second semester freshman year. CHEM 120 will substitute for CHEM 107/CHEM 117.

⁵ For BS-PETE, allocate 3 hours to core communications course (ENGL 210, COMM 203, COMM 205, or COMM 243) and/or 3 hours to UCC elective. For BS-MEEN, allocate 3 hours to core communications course (ENGL 203, ENGL 210, or COMM 205) and/or 3 hours to UCC elective.

Second Year

| Fall | | Semester Credit Hours |
|-----------------------|---------------------------------------------------------------------------------------|-----------------------|
| ENGR 217/ PHYS 217 | Experimental Physics and Engineering Lab III - Electricity and Magnetism ¹ | 2 |

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|-------------------------------------------|--------------------------------------------------------------------|---|
| MATH 251 | Engineering Mathematics III ¹ | 3 |
| MMET 181 | Manufacturing and Assembly Processes I ¹ | 3 |
| PHYS 207 | Electricity and Magnetism for Engineering and Science ¹ | 3 |
| STAT 211 | Principles of Statistics I ¹ | 3 |
| Select one of the following: ¹ | | 4 |
| CSCE 110 | Programming I | |
| CSCE 111 | Introduction to Computer Science Concepts and Programming | |
| CSCE 206 | Structured Programming in C | |

Semester Credit Hours 18

Spring

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|------------------------------|--------------------------------------------------------------|---|
| ISEN 210 | Fundamentals of Industrial Engineering Design ¹ | 4 |
| ISEN 230 | Informatics for Industrial Engineers ¹ | 3 |
| ISEN 310 | Uncertainty Modeling for Industrial Engineering ¹ | 3 |
| MATH 304 | Linear Algebra ¹ | 3 |
| MEEN 221 | Statics and Particle Dynamics | 3 |
| Select one of the following: | | |
| ENGL 203 | Writing about Literature | |
| ENGL 210 | Technical and Professional Writing | |
| COMM 203 | Public Speaking | |
| COMM 205 | Communication for Technical Professions | |

Semester Credit Hours 16

Third Year

Fall

| | | |
|------------------------------|----------------------------------------|---|
| ISEN 320 | Operations Research I ¹ | 3 |
| ISEN 330 | Human Systems Interaction ¹ | 3 |
| MATH 308 | Differential Equations ¹ | 3 |
| MSEN 222/ MEEN 222 | Materials Science | 3 |
| Select one of the following: | | 3 |
| BAEN 320 | Engineering Thermodynamics | |
| ECEN 215 | Principles of Electrical Engineering | |
| MEEN 315 | Principles of Thermodynamics | |

Semester Credit Hours 15

Spring

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| ISEN 340 | Operations Research II ¹ | 3 |
| ISEN 350 | Quality Engineering ¹ | 3 |
| ISEN 355 | System Simulation ¹ | 3 |
| ISEN 370 | Production Systems Engineering ¹ | 3 |
| High Impact Experience ⁷ | | 0 |
| ISEN 399 | Professional Development | |
| University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/) ³ | | 6 |

Semester Credit Hours 18

Fourth Year

Fall

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| PHEO 618 | Occupational Safety | 3 |
| SOPH 601 | Thinking in Populations: The Public Health Mindset | 2 |

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|---------------------------------|---------------------------------------------------------------|---|
| SOPH 602 | Investigation and Control: Acute Public Health Events | 3 |
| SOPH 603 | Assessment and Intervention: Wicked Problems in Public Health | 3 |
| Technical elective ¹ | | 6 |

Semester Credit Hours 17

Spring

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| ISEN 460 | Capstone Senior Design ¹ | 3 |
| PHEO 640 | Industrial Hygiene | 3 |
| PHEO 678 | Occupational Biomechanics ⁶ | 3 |
| SOPH 604 | Framing and Persuasion: Public Health in the Public Sphere | 1 |
| University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/) ³ | | 3 |

Semester Credit Hours 13

Summer

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---|
| PHEO 684 | Practicum | 3 |
| University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/) ³ | | 3 |

Semester Credit Hours 6

Fifth Year

Fall

| | | |
|-------------------------|-----------------------------------------------------------------------|---|
| ISEN 630 or ISEN 631 | Human Operator in Complex Systems or Cognitive Systems Engineering | 3 |
| PHEO 630 | Environmental/Occupational Diseases | 3 |
| PHEO 682 | Industrial and System Safety | 3 |
| PHEB 602 | Biostatistics I | 3 |

Semester Credit Hours 12

Spring

| | | |
|------------------------------|-------------------------------------|---|
| PHEO 655 | Human Factors | 3 |
| PHEO 679 | Ergonomics of the Upper Extremities | 3 |
| SOPH 680 | Public Health Capstone | 3 |
| Select one of the following: | | 3 |

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|---------------------------------|--------------------------------------------|--|
| PHEO 645 | Health and Safety at Hazardous Waste Sites | |
| ISEN/PHEO elective ⁸ | | |

Semester Credit Hours 12

Total Semester Credit Hours 127

⁶ Courses taken for credit in both the undergraduate and graduate degree for a combined total of 12 hours: PHEO 618, PHEO 640, PHEO 678, PHEO 679.

⁷ All students are required to complete a high-impact experience in order to graduate. The list of possible high-impact experiences is available in the INEN advising office.

⁸ ISEN/PHEO electives are approved by the BS/MPH program director and graduate advisor. ISEN electives must be taken for a grade of C or better.

The program includes a total of 170 hours which up to 12 hours may be applied toward both the Bachelor of Science in Industrial Engineering and the Master of Public Health in Occupational Safety and Health.

Total Program Hours 170