

INDUSTRIAL AND MANUFACTURING ENGINEERING (IND ENG)

IND ENG 111 Introduction to Engineering

3 cr. Undergraduate.

Introduction to Engineering Disciplines, problem solving methods, teamwork, technical communication, professionalism, and ethics.

Prerequisites: Math 116(C).

Course Rules: Counts as repeat of Ind Eng 210.

Last Taught: Spring 2021, Fall 2020, Spring 2020, Fall 2019.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 112 Engineering Drawing & Computer Aided Design/Drafting

3 cr. Undergraduate.

Visualization, Engineering Drawing, CAD, Geographic Information Systems (GIS), Group Project, Team Work.

Prerequisites: Math 116(P).

Course Rules: Counts as repeat of of Ind Eng 101.

Last Taught: Spring 2021, Fall 2020, Spring 2020, Fall 2019.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 299 Independent Reading and Work

1-3 cr. Undergraduate.

Credit hours to be arranged between student and staff on an individual basis.

Prerequisites: cons instr.

Last Taught: Spring 1994, Spring 1987.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 350 Manufacturing Processes

3 cr. Undergraduate.

Broad study of processes and equipment used in modern production.

Design considerations, economic factors, automation, metals and plastics processing, fabrication of electronic materials.

Prerequisites: MatlEng 201(P).

Last Taught: Fall 2020, Fall 2019, Fall 2018, Fall 2017.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 360 Engineering Economic Analysis

3 cr. Undergraduate.

Concept of time value of money. Economical evaluation of alternate projects and replacement policies using methods such as present worth, rate of return, and annual cost. Engineering investment decision analysis.

Prerequisites: jr st.

Last Taught: Spring 2021, Fall 2020, Spring 2020, Fall 2019.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 367 Introductory Statistics for Physical Sciences and Engineering Students

3 cr. Undergraduate.

Concepts of probability and statistics; probability distributions of engineering applications; sampling distributions; hypothesis testing; parameter estimation; regression analysis.

Prerequisites: B- or better in Math 211(P) or B- or better in Math 213(P) or C or better in Math 221(P) or C or better in Math 231(P)

Last Taught: Spring 2021, Fall 2020, Spring 2020, Fall 2019.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 369 Introduction to Probability and Statistical Inference

1 cr. Undergraduate.

Concepts of probability and statistics.

Prerequisites: MATH 221(P) or MATH 231(P).

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 370 Introduction to Operations Analysis

3 cr. Undergraduate.

Functions and philosophies of the contemporary engineer in the production/service environment as it is planned, designed, manufactured/delivered, maintained, controlled and distributed.

Prerequisites: Math 233(P)

Last Taught: Fall 2020, Fall 2019, Fall 2018, Fall 2017.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 390 Senior Thesis

1-3 cr. Undergraduate.

Independent research under the direction of a faculty member; submission of a written thesis is required.

Prerequisites: sr st & cons instr.

Course Rules: 3 cr total required. Need not all be taken during the same semester.

Last Taught: Summer 1988, Spring 1987, Fall 1986, Spring 1986.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 405 Product Realization

3 cr. Undergraduate/Graduate.

This interdisciplinary course (engineering and art students) considers the diverse aspects of the product realization process.

Prerequisites: jr st & admis to Art & Design prog or IAT prog; or Ind Eng 350(P), 360(P), 370(P); or MechEng 321(P), 360(P), 366(P), 370(P); or grad st & cons instr.

Course Rules: Art 405, MechEng 405, & Ind Eng 405 are jointly offered; they count as repeats of one another. Counts as repeat of Art 402/Ind Eng 590/MechEng 490 with same topic.

Last Taught: Spring 2018, Fall 2017.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 405G Product Realization

3 cr. Undergraduate/Graduate.

This interdisciplinary course (engineering and art students) considers the diverse aspects of the product realization process.

Prerequisites: jr st & admis to Art & Design prog or IAT prog; or Ind Eng 350(P), 360(P), 370(P); or MechEng 321(P), 360(P), 366(P), 370(P); or grad st & cons instr.

Course Rules: Art 405, MechEng 405, & Ind Eng 405 are jointly offered; they count as repeats of one another. Counts as repeat of Art 402/Ind Eng 590/MechEng 490 with same topic.

Last Taught: Spring 2018, Fall 2017.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 455 Operations Research I

3 cr. Undergraduate/Graduate.

Fundamental optimization methods; linear programming, integer programming, network models, and dynamic programming methods of operations research. Modeling and applications of these methods in practical situations.

Prerequisites: jr st; Math 233(P).

Last Taught: Fall 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 455G Operations Research I

3 cr. Undergraduate/Graduate.

Fundamental optimization methods; linear programming, integer programming, network models, and dynamic programming methods of operations research. Modeling and applications of these methods in practical situations.

Prerequisites: jr st; Math 233(P).

Last Taught: Fall 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 465 Operations Research II

3 cr. Undergraduate/Graduate.

Concepts and methods of probabilistic modeling in queueing, forecasting, and inventory problems for design and analysis of manufacturing and service operations.

Prerequisites: jr st; IND ENG 367(P) or MTHSTAT 467(P) or equiv course in statistics.

Last Taught: Spring 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 465G Operations Research II

3 cr. Undergraduate/Graduate.

Concepts and methods of probabilistic modeling in queueing, forecasting, and inventory problems for design and analysis of manufacturing and service operations.

Prerequisites: jr st; IND ENG 367(P) or MTHSTAT 467(P) or equiv course in statistics.

Last Taught: Spring 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 470 Methods Engineering

3 cr. Undergraduate/Graduate.

Use of production machine for producing a simple product. Study of production sequence, material flow, plant layout; time and motion; and the economics of materials and methods of fabrication. Redesign of the product and the methods of production to minimize total costs within physical, social and aesthetic constraints.

Prerequisites: junior standing and IND ENG 367(P).

Last Taught: Fall 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 470G Methods Engineering

3 cr. Undergraduate/Graduate.

Use of production machine for producing a simple product. Study of production sequence, material flow, plant layout; time and motion; and the economics of materials and methods of fabrication. Redesign of the product and the methods of production to minimize total costs within physical, social and aesthetic constraints.

Prerequisites: junior standing and IND ENG 367(P).

Last Taught: Fall 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 475 Simulation Methodology

3 cr. Undergraduate/Graduate.

Fundamentals of discrete-event simulation. Random number and random variable generation for simulation modeling and analysis using simulation software.

Prerequisites: IND ENG 367(P) and concurrent enrollment in one of the following: COMPSCI 151(C), COMPSCI 202(C), COMPSCI 240(C), or COMPSCI 250(C).

Last Taught: Spring 2021, Spring 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 475G Simulation Methodology

3 cr. Undergraduate/Graduate.

Fundamentals of discrete-event simulation. Random number and random variable generation for simulation modeling and analysis using simulation software.

Prerequisites: IND ENG 367(P) and concurrent enrollment in one of the following: COMPSCI 151(C), COMPSCI 202(C), COMPSCI 240(C), or COMPSCI 250(C).

Last Taught: Spring 2021, Spring 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 485 Senior Design Project

3 cr. Undergraduate.

Capstone design projects involving design of a production/service system. Progress reports, final report, and presentation.

Prerequisites: sr st, Ind Eng 370(P), 455(P), 465(C), 470(C), 475(P), 571(C), 580(C), 583(C).

Last Taught: Spring 2021, Fall 2020, Spring 2020, Fall 2019.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 499 Ad Hoc:

1-12 cr. Undergraduate.

Course created expressly for offering in a specified enrollment period. Requires only dept & assoc dean approval. In exceptional circumstances, can be offered in one add'l sem.

Prerequisites: none; add'l prereqs may be assigned to specific topic.

Course Rules: May be retaken w/chg in topic.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 550 Control of Automated Manufacturing Systems

3 cr. Undergraduate/Graduate.

Theoretical and practical skills to design and control automated manufacturing systems and industrial processed through science-based theoretical advancements and state-of-the-art industrial applications.

Prerequisites: jr st; ElecEng 234(P); 301(P).

Last Taught: Spring 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 550G Control of Automated Manufacturing Systems

3 cr. Undergraduate/Graduate.

Theoretical and practical skills to design and control automated manufacturing systems and industrial processed through science-based theoretical advancements and state-of-the-art industrial applications.

Prerequisites: jr st; ElecEng 234(P); 301(P).

Last Taught: Spring 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 571 Quality Control

3 cr. Undergraduate/Graduate.

Statistical process quality design and control. Process control charts, six sigma and process capability assessment.

Prerequisites: junior standing and IND ENG 367(P), or equivalent course in statistics; or graduate standing.

Last Taught: Spring 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

IND ENG 571G Quality Control

3 cr. Undergraduate/Graduate.

Statistical process quality design and control. Process control charts, six sigma and process capability assessment.

Prerequisites: junior standing and IND ENG 367(P), or equivalent course in statistics; or graduate standing.**Last Taught:** Spring 2021.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 572 Reliability Engineering**

3 cr. Undergraduate/Graduate.

Concepts and methods for the design, testing, and estimation of component and system reliabilities. Failures and failure rates; life tests; series-parallel, and standby systems; stress levels; redundancy and reliability apportionment; maintainability, availability, and safety; reliability design and implementation.

Prerequisites: jr st; Ind Eng 467(P) or equiv.**Last Taught:** Spring 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 572G Reliability Engineering**

3 cr. Undergraduate/Graduate.

Concepts and methods for the design, testing, and estimation of component and system reliabilities. Failures and failure rates; life tests; series-parallel, and standby systems; stress levels; redundancy and reliability apportionment; maintainability, availability, and safety; reliability design and implementation.

Prerequisites: jr st; Ind Eng 467(P) or equiv.**Last Taught:** Spring 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 575 Design of Experiments**

3 cr. Undergraduate/Graduate.

Statistical principles, designs and analyses for planned experimentation; factorial and fractional factorial designs, inner-outer designs, robustness, confounding and blocking, and response surface methodology.

Prerequisites: IND ENG 367(P) or equivalent.**Last Taught:** Spring 2021.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 575G Design of Experiments**

3 cr. Undergraduate/Graduate.

Statistical principles, designs and analyses for planned experimentation; factorial and fractional factorial designs, inner-outer designs, robustness, confounding and blocking, and response surface methodology.

Prerequisites: IND ENG 367(P) or equivalent.**Last Taught:** Spring 2021.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 577 Dimensional Measurement and Tolerancing**

3 cr. Undergraduate/Graduate.

Measurement techniques; implementation and integration of precision measuring equipment and gages in manufacturing systems; geometric dimensioning and tolerancing; and devices for statistical process control.

Prerequisites: sr st & Ind Eng 467(P).**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 577G Dimensional Measurement and Tolerancing**

3 cr. Undergraduate/Graduate.

Measurement techniques; implementation and integration of precision measuring equipment and gages in manufacturing systems; geometric dimensioning and tolerancing; and devices for statistical process control.

Prerequisites: sr st & Ind Eng 467(P).**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 580 Ergonomics**

3 cr. Undergraduate/Graduate.

Broad study of ergonomics principles and stresses in design and analysis of workplaces and physical environment.

Prerequisites: IND ENG 367(P); CIV ENG 201(P) or CIV ENG 203(P).**Course Rules:** 2 hrs lec & 2 hrs lab/week.**Last Taught:** Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 580G Ergonomics**

3 cr. Undergraduate/Graduate.

Broad study of ergonomics principles and stresses in design and analysis of workplaces and physical environment.

Prerequisites: IND ENG 367(P); CIV ENG 201(P) or CIV ENG 203(P).**Course Rules:** 2 hrs lec & 2 hrs lab/week.**Last Taught:** Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 582 Ergonomic Job Evaluation Techniques**

3 cr. Undergraduate/Graduate.

Review of popular, contemporary methods of job evaluation for risk of low back pain and distal upper extremity.

Prerequisites: sr st & Ind Eng 580(P).**Last Taught:** Spring 2021.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 582G Ergonomic Job Evaluation Techniques**

3 cr. Undergraduate/Graduate.

Review of popular, contemporary methods of job evaluation for risk of low back pain and distal upper extremity.

Prerequisites: sr st & Ind Eng 580(P).**Last Taught:** Spring 2021.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 583 Facility Layout and Material Handling**

3 cr. Undergraduate/Graduate.

Basics in facility planning; design and integration of plant layout, material handling, and warehousing; quantitative models for facility location problems.

Prerequisites: sr st, Ind Eng 370(P), Ind Eng 455(C)**Last Taught:** Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 583G Facility Layout and Material Handling**

3 cr. Undergraduate/Graduate.

Basics in facility planning; design and integration of plant layout, material handling, and warehousing; quantitative models for facility location problems.

Prerequisites: sr st, Ind Eng 370(P), Ind Eng 455(C)**Last Taught:** Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>

IND ENG 584 Biodynamics of Human Motion

3 cr. Undergraduate/Graduate.

Techniques for collecting, analyzing and interpreting human motion data. Special emphasis will be placed on performing data analysis using the software package, Matlab.

Prerequisites: jr st; ElecEng 234(P); Civ Eng202(C).**Last Taught:** Spring 2013, Spring 2012.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 584G Biodynamics of Human Motion**

3 cr. Undergraduate/Graduate.

Techniques for collecting, analyzing and interpreting human motion data. Special emphasis will be placed on performing data analysis using the software package, Matlab.

Prerequisites: jr st; ElecEng 234(P); Civ Eng202(C).**Last Taught:** Spring 2013, Spring 2012.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 587 Lean Production Systems**

3 cr. Undergraduate/Graduate.

An integrated approach to efficient manufacturing of products with high quality, low cost, and timely delivery including one-piece flow, pull system, and visual factory.

Prerequisites: Ind Eng 350(P).**Last Taught:** Spring 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 587G Lean Production Systems**

3 cr. Undergraduate/Graduate.

An integrated approach to efficient manufacturing of products with high quality, low cost, and timely delivery including one-piece flow, pull system, and visual factory.

Prerequisites: Ind Eng 350(P).**Last Taught:** Spring 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 590 Topics in Industrial and Systems Engineering:**

1-3 cr. Undergraduate/Graduate.

Selected topics of current interest in an area of systems design.

Prerequisites: sr st.**Course Rules:** May be retaken w/chg in topic to max of 9 cr.**Last Taught:** Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 590G Topics in Industrial and Systems Engineering:**

1-3 cr. Undergraduate/Graduate.

Selected topics of current interest in an area of systems design.

Prerequisites: sr st.**Course Rules:** May be retaken w/chg in topic to max of 9 cr.**Last Taught:** Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 699 Independent Study**

1-3 cr. Undergraduate/Graduate.

Prerequisites: jr st; cons instr.**Course Rules:** Limited to max of 6 cr applied toward undergraduate degree.**Last Taught:** Spring 2021, Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 699G Independent Study**

1-3 cr. Undergraduate/Graduate.

Prerequisites: jr st; cons instr.**Course Rules:** Limited to max of 6 cr applied toward undergraduate degree.**Last Taught:** Spring 2021, Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 700 CEAS Graduate Seminar**

1-3 cr. Graduate.

Seminar in professional ethics, oral and written communication, contemporary social issues, career development, time management, and laboratory safety.

Prerequisites: grad st**Course Rules:** Civ Eng 700, CompSci 700, ElecEng 700, Ind Eng 700, MatlEng 700 & MechEng 700 are jointly offered and count as repeats of one another**Last Taught:** Fall 2020, Spring 2020, Fall 2019, Spring 2019.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 716 Engineering Statistical Analysis**

3 cr. Graduate.

Statistical methods and their applications to solve engineering decision-making problems, integrating computer usage. Inference, probability and probability distributions, data analysis, regression analysis, and anova.

Prerequisites: grad st.**Last Taught:** Spring 2021, Spring 2020, Spring 2019, Fall 2017.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 717 Operations Research in Engineering Management**

3 cr. Graduate.

Various operations research techniques for engineering management decision-making. Linear programming, integer programming, network models, multi-objective decision-making, decision analysis, and queuing models.

Prerequisites: grad st; Ind Eng 716(P).**Last Taught:** Fall 2020, Fall 2019, Fall 2016, Fall 2015.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 750 Group Technology and Process Planning**

3 cr. Graduate.

Group technology and computer-aided process planning; classification and coding schemes, machine loading, production planning/scheduling models, process planning, expert systems in capp.

Prerequisites: grad st; Ind Eng 450 & 455.**Last Taught:** Spring 2007, Spring 2003, Spring 2001, Fall 1999.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 751 Flexible Manufacturing Systems**

3 cr. Graduate.

Hierarchy of manufacturing control, process control, advanced concepts in fms, optimal design planning and production scheduling in fms.

Prerequisites: grad st; Ind Eng 450 & 455.**Last Taught:** Fall 2020, Fall 2018, Fall 2017, Fall 2015.**Current Offerings:** <https://catalog.uwm.edu/course-search/>

IND ENG 765 Operations Research Methods

3 cr. Graduate.

Formulation and application of mathematical models for the design of industrial systems. Mathematical programming, network flow, decision theory and simulation techniques are used for solving single and multi-stage production, inventory and service problems.

Prerequisites: grad st; Ind Eng 465 & 767.**Last Taught:** Spring 2021, Spring 2020, Spring 2019, Spring 2018.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 772 Facilities Planning**

3 cr. Graduate.

Modern techniques in facilities planning, location of the facility; systems approach, factors and evaluation. Systematic layout planning, computerized methods. Assembly line balancing, simulation techniques. Cpm and pert. Projects and laboratory work.

Prerequisites: grad st; Ind Eng 455 & 470.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 777 Scheduling and realtime resource management**

3 cr. Graduate.

Scheduling (allocation of resources over time) and realtime resource management techniques in highly informative production and service systems.

Prerequisites: grad st; Ind Eng 370(P), 475(P), 455(P), 465(P) or cons instr**Last Taught:** Spring 2020, Spring 2017, Spring 2015, Fall 2010.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 780 Advanced Ergonomics - Low Back Pain**

3 cr. Graduate.

An in-depth study of lbp causes, risk factors, preventive approaches, job evaluation/design techniques. 2 hr lec & 2 hr lab/week.

Prerequisites: grad st; Ind Eng 580(P); a course in anatomy & physiology or cons instr.**Last Taught:** Spring 2019, Spring 2013, Fall 2009, Fall 2007.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 783 Advanced Ergonomics - Upper Extremity**

3 cr. Graduate.

In depth study of musculoskeletal disorders of upper extremity, personal and job risk factors, job analysis, design and prevention. 2 hr lec & 2 hr lab/week.

Prerequisites: grad st; Ind Eng 580(P); a course in Anatomy & Physiology or cons instr.**Last Taught:** Spring 2011, Fall 2008, Fall 2006, Spring 2005.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 786 Applied Biostatistics in Ergonomics**

3 cr. Graduate.

Statistical methods used in ergonomic studies to analyze, summarize, and report measurements and data. 2 hr lec & 2 hr lab/week.

Prerequisites: grad st; Ind Eng 580(P); a course in statistics or cons instr.**Course Rules:** Jointly offered with & counts as repeat of OccThpy 786.**Last Taught:** Fall 2007, Spring 2006, Fall 2004, Fall 2003.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 790 Design Project**

2-3 cr. Graduate.

Integration and application of concepts learned in other ergonomic courses to analyze and abate ergonomic hazards in a scientific manner.

Prerequisites: grad st; Ind Eng 780(P), 783(P), 786(P), 788(P); or cons instr.**Course Rules:** Jointly offered with & counts as repeat of OccThpy 790.**Last Taught:** Spring 2007, Fall 2004, Fall 2003, Spring 2002.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 880 Bioengineering Seminar**

1 cr. Graduate.

Presentations by bioengineering affiliated faculty, invited speakers, and graduate students.

Prerequisites: grad st**Course Rules:** MechEng 880, ElecEng 880, CompSci 880, MatlEng 880, IndEng 880 & Civ Eng 880 are jointly offered and count as repeats of one another. May be repeated to 3 cr. max.**Last Taught:** Fall 2018, Spring 2018, Spring 2017, Fall 2016.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 888 Candidate for Degree**

0 cr. Graduate.

Available for graduate students who must meet minimum credit load requirement.

Prerequisites: graduate standing.**Course Rules:** Fee for 1 cr assessed; unit does not count towards credit load for Fin Aid. Repeatable. Satisfactory/Unsatisfactory only.**Last Taught:** Fall 2020, Summer 2017, Summer 2016, Fall 2009.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 890 Advanced Topics in Industrial and Systems Engineering:**

1-3 cr. Graduate.

Advanced topics of current interest in an area of systems-design; review of recent literature. Subject matter may be student initiated. Specific topics and any additional prerequisites will be announced in the Schedule of Classes.

Prerequisites: graduate standing.**Course Rules:** May be repeated with change in topic to max of 15 cr.**Last Taught:** Fall 2020, Spring 2020, Fall 2019, Spring 2019.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 990 Masters Thesis**

1-9 cr. Graduate.

Prerequisites: grad st; cons instr.**Last Taught:** Spring 2021, Fall 2020, Summer 2020, Spring 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 998 Doctoral Thesis**

1-12 cr. Graduate.

Prerequisites: grad st; cons instr & grad prog comm.**Last Taught:** Summer 2021, Spring 2021, Fall 2020, Summer 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**IND ENG 999 Advanced Independent Study**

1-3 cr. Graduate.

Prerequisites: grad st; cons instr & grad prog committee.**Last Taught:** Summer 2021, Spring 2021, Fall 2020, Summer 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>