

Department of Industrial Engineering and Operations Research
University of the Philippines Diliman



INDUSTRIAL ENGINEERING UNDERGRADUATE PROGRAM HANDBOOK

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1. INTRODUCTION

A. Background

Industrial Engineering is the application of engineering methods and principles of scientific management to various systems. These systems extend beyond traditional manufacturing operations to include service-oriented sectors such as healthcare, transportation, and more. Industrial Engineering focuses on the design, improvement, and installation of integrated systems involving people, materials, equipment, and facilities. It draws upon knowledge from the mathematical, physical, and social sciences, combined with principles of engineering analysis and design, to optimize and evaluate system performance.

The Bachelor of Science in Industrial Engineering (BS IE) program offered by the Department of Industrial Engineering and Operations Research (IE/OR) at the University of the Philippines, Diliman emphasizes a strong foundation in science and engineering principles. The program curriculum has been designed to provide a comprehensive industrial engineering education while adhering to a balanced academic load. By the end of the program, students are equipped with the skills and knowledge necessary to address complex real-life systems and challenges. Our graduates are well-prepared to enter careers in a variety of professional fields, including engineering, management, and research.

B. Objective of this Handbook

The goal of this handbook is to provide students with essential information regarding admission, degree requirements, and the general policies and procedures of the Bachelor of Science in Industrial Engineering (BS IE) program under the Department of Industrial Engineering and Operations Research (IE/OR).

In some cases, students may find differences between the policies of the College of Engineering and the department's policies. In such instances, the IE/OR Department has set higher standards or additional requirements compared to the College of Engineering. Students must comply with both sets of requirements.

Please note that policies and procedures are occasionally revised or amended to improve the program. Any changes will be communicated to students through email, and posted on paper and online bulletin boards.

2. ADMISSIONS

A. Regular Admissions

The UP Department of Industrial Engineering and Operations Research, in its commitment to the pursuit of academic excellence and in light of the mandate of the University of the Philippines as the national university, seeks to democratize admission into the University through the Excellence-Equity Admissions System (EEAS). This system offers equal opportunities to qualified applicants, irrespective of their socioeconomic backgrounds, fostering diversity and inclusivity. Geographic diversity is also encouraged to bring different perspectives to the student body, enhancing education and research quality.

The department maintains high academic standards by admitting the most qualified candidates, ensuring graduates are well-prepared for the field. Admission guidelines include:

1. Graduating students or graduates from the Department of Education - accredited high schools who have not applied to any college, can apply as freshmen based on their UP College Admission Test (UPCAT) scores and high school grades.
2. Graduating students or graduates from international high schools who have not applied to any college, can apply as freshmen with specific requirements, such as completion of the high school program and qualifications for college admission by national or international foreign-administered examinations. Foreign language proficiency is required for non-native English speakers.
3. Transferees from other schools and shiftees from other UP units are also admitted into the undergraduate programs provided they meet the grade requirements of the department they seek admission to. (See Section E)
4. A maximum of 110 qualified applicants are admitted each year (as of AY 2022-2024).

Undergraduate admissions primarily depend on the UPCAT, while graduate admissions depend on the applicant's GWA (General Weighted Average) and recommendations, even for non-engineering backgrounds. Refer to the Engineering Catalogue in Appendix 3 for more details.

Deferment of Enrolment

Qualified freshmen applicants who, for a valid reason cannot enroll during the semester originally applied for, may apply for deferment of enrollment to the next succeeding semester by writing to the Office of the University Registrar (OUR). Such applicants must not take any academic college subject before enrollment. The maximum period allowed by UP for deferment of enrolment is one (1) academic year.

B. Shiftee and Transferee Admissions

B.1 Admissions

Students from within the College of Engineering (Shiftee 1), from other units within UP Diliman (Shiftee 2), from another UP Constituent University (Transferee 1), or from other colleges/universities and 2nd degree students (Transferee 2) may be admitted subject to the admission rules of the Department.

B.2 Admission Requirements

Students shifting/transferring from within the university must comply with the following admission requirements (referenced from UP College of Engineering Transfer Requirements

- General Weighted Average (GWA) = 2.0 or better
- Math & Science Weighted Average (MSWA) = 2.25 or better
- Must have passed Math 22 (Elementary Analysis I) or equivalent
- No grade of 5.0 (Fail); no unremoved 4.0 (Conditional Fail) or INC (Incomplete)
- Must have completed at least 30 academic units
- True Copy of Grades (TCG) or CRS printout of grades
- Office of Student Ethics (OSE) Clearance/Certificate of Good Moral Character or equivalent
- Letter (w/ signature and contact details) addressed to the Department Chair stating the reason for shifting/transferring

Students from other universities wishing to transfer to the BSIE program must meet both the University's and the Department's admission requirements. Their admission is subject to the program's quota and evaluation based on specific criteria. Transferees must complete at least 50% of the required units at the University, including all upper-division courses in the program.

Exceptions to these requirements can be made in exceptional cases, with recommendations from the Department's UARSAC or the Dean, subject to the Chancellor's approval. The Department identifies qualified applicants, and the College Secretary and University Registrar issue admission slips to successful candidates.

B.3 Additional Admission Requirements (for Transferees)

New transfer applicants must submit the following documents at least one month before the first semester's registration period:

1. Official transcripts from all previously attended colleges, even if they intend to validate advanced credits.
2. Completed application form (UP Form 3.1).
3. Two passport-size photographs.

4. Non-refundable application fee of PHP 100 for Filipinos (PHP 150 for resident foreign applicants or USD 20 for non-resident foreign applicants).

If qualified, the student must also provide an official transcript and a certificate of honorable dismissal before receiving the University admission slip.

B.4 Acceptance Period for Shiftees and Transferees

Applicants under the Shiftee 1 category may apply for admission to the BS IE program for the First Semester and the Second Semester, while those under the Shiftee 2, Transferee 1 or Transferee 2 may only apply for admission before the start of the First Semester of the succeeding academic year.

B.5 Substitution of Subjects for Shiftee 1, Shiftee 2, and Transferee 1 students

For students admitted from within the college, from other colleges within the university, and from other UP Constituent universities, a substitution form may be filed to request crediting of subjects taken prior to entering the program. All substitutions are subject to approval of the adviser, department chair/institute director of the Unit offering the subject taken, and the department chair/institute director of the Unit offering the subject required. The detailed process may be found on the College of Engineering official website (<https://coe.upd.edu.ph/forms-undergraduate/>).

B.6 Advanced Credits (i.e., Credit subjects taken outside the University of the Philippines) for Transferee 2 students

Transferee 2 students are admitted on a probationary basis until they validate or repeat/take all required subjects originally taken outside the University. They must validate all courses they seek advanced credit for at a rate of 18 units per semester within a maximum of three semesters from their admission date. Failure to meet this requirement results in registration privileges being revoked. Additionally, students may not enroll in subjects with prerequisites taken elsewhere that haven't been validated or repeated at the University.

Exceptions to these rules can be made in exceptional cases, with recommendations from the Chair or Dean and approval by the Chancellor.

Students transferring from recognized institutions with an Associate in Arts or its equivalent of 66 units may be enrolled without validation. However, additional units of general education or preparatory subjects may be required before majoring in BS IE.

To apply for advance credits, students must use the prescribed form and submit it to the University Registrar, Dean, and Department Chair of their admitted department. Validation tests occur before and after the registration period, with fees applicable outside this timeframe. The

detailed process for Validation and Advanced Credit without Validation may be found on the College of Engineering official website (<https://coe.upd.edu.ph/forms-undergraduate/>)

Advance standing may also be granted for subjects recognized by the University Council. For subjects with no equivalent at the University, faculty from relevant units decide on granting advance credit.

3. STUDENT PERFORMANCE AND PROGRESS

A. Evaluating Student Performance

At the start of each semester for each course, students receive a course syllabus which includes the Student Outcomes, and Course Outcomes. Student outcomes outline the skills and values expected upon graduation, which the course aims to enhance. Course outcomes detail the expected capabilities by the course's end. The syllabus also provides a course outline, requirements, and grading system. Assessments such as exams, quizzes, homework, projects, and reports are used for evaluation of student performance. Final grades at semester-end are based on the scores from these course requirements.

B. Summary of Student Performance Evaluation Process

Assessment tools vary in scope. Quizzes, seatwork, board work, oral recitations, and laboratory activities are used to assess specific topic objectives, while long exams and problem sets evaluate proficiency across a broader range of related topics. Typically, these assessments focus on applying mathematical and physical science knowledge, as well as related theoretical industrial engineering topics.

Projects are also part of the curriculum, allowing students to solve complex industrial engineering problems using computational tools. These projects can range from short workshops and surveys to longer-term endeavors such as equipment, plant, product design, and research. Longer-term projects involve in-depth research, experimentation, computation, and analysis.

Student's grades are determined by their score on course requirements, with specific weightings based on their contribution to achieving the student outcomes. The overall weighted average is translated into a final grade following the University's grading system.

Before final grades are assigned, students have the opportunity to review their requirements and discuss their performance with the teacher during consultation sessions. These sessions also provide teachers with a chance to provide feedback on student's progress and class standing.

C. Monitoring Student Progress

The department prepares for the upcoming academic year by conducting an enrollment survey, allowing students to express their course preferences for the next semester with the Course Demand Survey. The survey results help the department schedule courses, determine the right number of sections, and maintain appropriate class sizes, as per the BSIE Program curriculum. In addition, the survey aids in monitoring student's academic progress by year, serving as a foundation for future curriculum and program development.

The department also conducts a Grievance Survey to collect feedback from students, providing them with an opportunity to voice concerns about their educational experience, faculty, or other relevant matters. By actively addressing student feedback through this survey, the department aims to improve the overall learning environment and meet student's academic needs and well-being effectively. Insights from the grievance survey contribute to ongoing improvement efforts, refining policies and procedures for the betterment of the BS IE program and the academic community as a whole.

Alongside the department's online grievance survey, the department's annual General Assembly is also an outlet for students to voice out their academic concerns. This is held in partnership with the Engineering Student Council and is organized every year.

C.1 Registration Advising

Advising is a crucial part of the registration process each semester. Before enrolling in classes, students must meet with their assigned faculty adviser. The adviser uses the Computerized Registration System (CRS) to review the student's academic record, ensuring that all prerequisites for upcoming classes have been met in previous semesters.

During the meeting, the student discusses their intended course schedule with the faculty adviser, who provides guidance and approves the list of classes. The discussion includes a review of the student's academic history, including past courses and grades, to assess their progress in the BS IE Program. This information helps students plan their future courses and determine an appropriate study load for the semesters leading to graduation.

C.2 Waiver of Prerequisites

Students who fail to pass a course prerequisite may apply for a waiver to be allowed to enroll in the next course in the program. This waiver, however, may not be applicable for all subjects in the curriculum and is approved on a case-to-case basis. Those who file such requests must (1) have already fully attended the prerequisite course to be waived, (2) be deemed to have a meritorious case by the Department, and (3) take the waived prerequisite course at the earliest possible semester.

D. Retention, Permanent Disqualification and Appeals for Readmission

Retention

D.1 College Rules on Scholastic Standing

Good Scholastic Standing

A student is in good scholastic standing if, at the end of the semester, s/he obtains final grades of 3.00 or higher in at least 75% of the total number of academic units in which s/he is registered (including those units for which the student has incurred a grade of 'DRP', unremoved 4.00 and 'Inc').

D.2 College Rules on Scholastic Delinquency

A student who fails to meet the minimum requirements of good scholastic standing are considered in scholastic delinquency, wherein the ff. provisions may apply, depending on the degree of scholastic delinquency: (1) Warning, (2) Probation, (3), Dismissal, and (4) Permanent Disqualification. These rules apply to students in the College of Engineering, with some variations based on the year of admission and specific circumstances. From College Rules on Scholastic Standing, College of Engineering, as of October 17, 2018, (<https://coe.upd.edu.ph/rules-and-regulations/>)

1. Warning

If a student receives final grades below 3.00 in 25% to 49% of their registered academic units, they will receive a warning to improve their performance.

2. Probation

Students will be placed on probation if they receive final grades below 3.00 in 50% to 75% of their academic units or fail to achieve a 3.00 or better in one attempt for specific courses. Probation limits their course load for the next semester.

A student who, at the end of the semester, fails to obtain final grades of 3.00 or better in ONE take in any of the subjects listed below shall be placed on probation for the succeeding semester:

- Math 21 or equivalent
- Math 22 or equivalent
- Math 23 or equivalent

3. Dismissal

Several conditions can lead to dismissal, including poor performance in specific courses, failing to meet retention rules, and exceeding the maximum residence period for degree completion.

Example:

A student who, at the end of the semester, fails to obtain final grades of 3.00 or better in two takes in any of the subjects listed below shall be dismissed from the College.

- *Math 21 or equivalent*
- *Math 22 or equivalent*
- *Math 23 or equivalent*

Please visit <https://coe.upd.edu.ph/rules-and-regulations/> for more information

4. Permanent Disqualification

A student who receives final grades below 3.00 in all their registered academic units (referred to as 'zero passing') at the end of the semester will be permanently barred from readmission to the College. Incomplete (INC) grades are not considered in scholastic standing calculations. When replaced by a final grade, it's included in the semester when the change occurs. A grade of 4.0 (Conditional Pass) counts until removal, and only the final grades of 3.0 or 5.0 matter afterward.

5. Appeals for Readmission

A dismissed BS IE program student may request readmission by writing a letter to the Department Chair, explaining the reason for scholastic issues. Before this, they must bring the letter and a filled-out Appeal Form from the Office of the College Secretary to the Office of Counseling and Guidance (OCG) for an interview and counseling.

The Department Chair forwards the appeal to the Undergraduate Admission, Readmission, Scholarships and Awards Committee (UARSAC) for evaluation. After deliberation, UARSAC recommends to the Chair, who decides on the appeal. The Chair's decision is then endorsed by the College Secretary, the Dean, the University Registrar, and the Vice Chancellor of Academic Affairs.

Readmission may come with conditions, like earning a set number of units in the first semester or passing specific required courses. Failing to meet these conditions may result in another dismissal from the program.

Readmission of dismissed or disqualified students requires a favorable recommendation from the Office of Counseling and Guidance (OCG). Cases in conflict with the OCG's recommendation may be elevated to the Vice Chancellor for Academic Affairs, whose decision is final.

4. ADVISING AND CAREER GUIDANCE

The requirements and process for advising and career guidance may be found in the University catalogue and the faculty manual.

Counseling & Guidance

The Office of Counseling and Guidance (OCG) is dedicated to fostering the holistic development of students, equipping them with the skills and values needed to be responsible global leaders. OCG offers counseling services by trained professionals, conducts various programs including career development, leadership training, and wellness workshops, and helps students enhance self-awareness, problem-solving abilities, and achievement capacity. These programs are free for UP students and available to non-UP individuals or groups for a fee. Counseling hours are weekdays from 8:00 a.m. to 5:00 p.m., with walk-in sessions for crises. Counseling sessions are confidential, and group activities can be arranged upon request, even on weekends. Their website can be accessed here (<https://ovcsa.upd.edu.ph/student-services/ocg/>).

5. GRADUATION REQUIREMENTS

Students must file a formal application as candidates for graduation with the office of the Dean of their respective colleges. They shall be recommended for graduation by the faculty after having satisfied all academic and other requirements prescribed for graduation.

A. Graduation Requirements

To become candidates for graduation, students must formally apply with the Office of the College Secretary and be recommended by the College Faculty after fulfilling all academic and other requirements.

During the first three (3) weeks after the opening of classes in each semester, each Dean or the duly authorized representative, shall submit to the University Registrar a list of candidates for graduation at the next commencement. The University Registrar, in consultation with the chairs of divisions or departments concerned, shall then inquire into the academic records of the candidates to ascertain whether any candidate in such a list has any deficiency to make up and

whether s/he has fulfilled all other requirements to be a candidate for graduation. If there is any question regarding a candidate, her/his name should not be deleted from the list of candidates for graduation, but a footnote to that effect should be made. Ten (10) weeks before the end of a semester, the University Registrar shall publish a complete list of duly qualified candidates for graduation for that semester.

The Dean submits a list of candidates for graduation to the University Registrar within the first three weeks of each semester. The University Registrar checks candidate records for deficiencies and other requirements. A complete list of qualified candidates for graduation is published ten weeks before the end of a semester.

Candidates must clear deficiencies and records at least five weeks before their last semester, except for academic subjects and Physical Education (PE) and the National Service Training Program (NSTP). Students under a curriculum older than ten years have specific rules for graduation. All graduates must have completed at least one year of residence work, except in special cases. Payment of graduation fees is no longer required under the Universal Access to Quality Tertiary Education Act (RA 10931). If fees aren't paid, graduates can still obtain certified copies of their credentials but without specifying the completion of a particular degree.

All candidates for graduation must have their deficiencies settled and their records cleared not later than five (5) weeks before the end of their last semester, with the exception of those in academic subjects and work in Physical Education and NSTP, in which the student is currently enrolled.

A candidate for graduation who began studies under a curriculum more than ten (10) years old shall be governed by the following rules [Revised UP Code: Art. 405]:

1. those who had completed all the requirements of the curriculum but did not apply for, nor were granted, the corresponding degree or title shall have their graduation approved as of the date they should have originally graduated.
2. those who had completed all but two (2) or three (3) subjects required by a curriculum shall be made to follow any of the curricula enforced from the time they first attended the University to the present.

No student shall be graduated from the University unless s/he has completed at least one (1) year of residence work which may, however, be extended to a longer period by the proper faculty. The residence work referred to must be done immediately prior to graduation in case of the following [Revised UP Code: Art. 408 as amended at 1082nd BOR 16 Dec. 1994]:

1. for transferees from schools other than the University of the Philippines, this residence requirement is in addition to completion of at least 50% of the required units for the course;

2. students who have been readmitted after being absent without official leave, shall also be subject to the one-year residence requirement.

No student shall be conferred any title or degree who fails to pay the required graduation fee within the specified period set by the University Registrar. Such student may, however, upon request and payment of the necessary fees, be given a certified copy of his/her credentials without specifying his/her completion of the requirements toward any title or degree

Revised UP Code: Art. 409 as amended at 790th BOR Meeting: 19 Dec 1969 and 861st BOR Meeting: 29 May 1975.

(<https://our.upd.edu.ph/files/acadinfo/GRADUATION%20REQUIREMENTS.pdf>)

B. Graduation with Honors

Students who complete their courses with the following absolute minimum WAG shall be graduated with honors:

- Summa cum laude - 1.200
- Magna cum laude - 1.450
- Cum laude - 1.750

Students who wish to graduate with honors must meet specific criteria:

All grades in required and elective subjects, within the curriculum, are included in the weighted average grade calculation. In cases of extra electives, priority is given to those taken in chronological order. For students who shifted programs, electives are chosen based on certain criteria in chronological order. Candidates for honors must complete at least 75% of the total academic units for graduation and be in residence for at least two years prior to graduation. Only resident credits are considered in the final average for honors. Students found guilty of cheating or misconduct are disqualified from graduating with honors. Candidates for honors must take a minimum load per semester unless justified by health, course unavailability, or work. Appropriate documentation is required.

Revised UP Code: Art 410 as amended at 958th BOR Meeting: 24 Feb 1983.
(<https://our.upd.edu.ph/files/acadinfo/GRADUATION%20WITH%20HONORS.pdf>)

6. UNDERGRAD PROGRAM PROFILE

A. Overview

The Department of Industrial Engineering and Operations Research offers Bachelor of Science in Industrial Engineering (BSIE). The core courses offered by the Department are grouped into

four areas of specialization: Operations Research (OR), Production Systems (PS), Human Factors and Ergonomics (HFE), and Analytics Systems Engineering (ASE).

Students under the BSIE program will engage in a comprehensive curriculum totaling 157 units of coursework for those who graduated from the STEM strand in senior high school, or 161 units (157 units + 4 units college math) for those from the Non-STEM strand. The program of study includes 30 units of general education courses, 31 units of foundation courses, 71 units of core courses, 16 units of cognate courses, 3 units of mandated courses, and 6 units of elective courses. In addition to the 157 units of coursework, 14 units of physical education and NSTP courses are required. Students of the Non-STEM strand must also take an additional 4 units of college math in their first year.

B. Areas of Specialization

1. Operations Research

Operations Research (OR) is the application of scientific methods, techniques, and tools to problems involving the operations of a system so as to provide those in control of the system with optimum solutions to the problems. Its distinctive approach is to develop a mathematical model of the system, incorporating measurements of factors such as chance and risk with which to predict and compare the outcomes of alternative decisions, strategies and controls. The purpose is to help determine optimal policies and actions scientifically. As systems become more complex, one must resort to modern methods of analysis and optimization.

2. Production Systems

Production is the process by which goods and services are created. These processes are found in factories, offices, hospitals, supermarkets, etc. The Production Systems (PS) option is designed to equip students with advanced and specialized knowledge of modern industrial engineering principles and practices such as supply chain management, service science, lean manufacturing and total quality management among others.

3. Human Factors and Ergonomics

Human Factors and Ergonomics is the scientific study of human characteristics for the appropriate design of the living and work environment. It is concerned with ensuring that the work system is conducive to good performance and work effectiveness, and consequently that the work environment is compatible with the health, safety and comfort of the worker.

The Human Factors and Ergonomics (HFE) option intends to provide the students with the concepts, tools and techniques in the analysis, specification, design, evaluation, operation and maintenance of products and systems to enhance the effective and satisfying use of individuals, groups and organizations. It relies heavily on the application of knowledge from various fields in

the human sciences, and technology including anthropometrics, biomechanics, physiology, psychology, toxicology, industrial design, information technology and industrial management.

4. Analytics Systems Engineering

An analytics system is the interaction of people, machines and procedures to provide information to support decision making and system operations. Information has become very important because of the increasing cost and scarcity of resources available to an organization. The Analytics Systems Engineering (ASE) option intends to provide the students with the concepts, tools and techniques in the analysis, design and implementation of manual and computer-based Analytics Systems. It relies heavily on the applications of computer and information technology as well as operations research.

6.1 COURSE DESCRIPTIONS

Source: <https://catalogue.upd.edu.ph/>

A. Foundation Courses

Math 20	Precalculus: Functions and their Graphs. Equations and inequalities; two dimensional coordinate system, graphs of equations; conic sections; functions and their graphs; trigonometric functions and trigonometric identities; inverse trigonometric functions; solutions of triangles; polar form of complex numbers. Pre–requisites: High School Algebra/Equivalent. Credit: 4 units (4 hrs lecture).
Math 21	Elementary Analysis I. Limits and continuity; derivatives of algebraic and transcendental functions (exponential, logarithmic, trigonometric, hyperbolic, and their inverses); applications of derivatives; antiderivatives and definite integrals; Fundamental Theorem of Calculus; applications of the definite integral. Pre–requisites: High School Basic Calculus/Math 20/Equivalent. Credit: 4 units (4 hrs lecture).
Math 22	Elementary Analysis II. Techniques of integration; improper integrals; parametric equations and polar coordinates; lines in space, planes, cylindrical surfaces, surfaces of revolution, and quadric surfaces; vectors and vector-valued functions; sequences and series. Pre–requisites: Math 21/Equivalent. Credit: 4 units (4 hrs lecture).
Math 23	Elementary Analysis III. Functions of several variables; limits and continuity of functions of several variables; partial derivatives and the

total differential; directional derivatives; relative and absolute extrema of functions of several variables; double and triple integrals; applications of multiple integrals; vector fields; line and surface integrals. Pre-requisites: Math 22/Equivalent. Credit: 4 units (4 hrs lecture).

Physics 71 **Elementary Physics I.** Mechanics of particles, rigid bodies and fluids. Pre-requisites: None. Co-requisite: Math 21/Equivalent. Credit: 4 units (3 hrs lecture, 1 hr discussion).

Physics 71.1 **Elementary Physics I Laboratory.** Pre-requisites: None. Co-requisite: Physics 71. Credit: 1 unit (2 hrs laboratory).

Physics 72 **Elementary Physics II.** Electricity and magnetism, wave phenomena, and optics. Pre-requisites: Physics 71. Co-requisite: None. Credit: 4 units (3 hrs lecture, 1 hr discussion).

Physics 72.1 **Elementary Physics II Laboratory.** Pre-requisites: Physics 71.1. Co-requisite: Physics 72. Credit: 1 unit (2 hrs laboratory).

B. Core Courses

IE 21 **Industrial Materials and Processes.** Industrial materials and processes and their effects on production system decisions. Pre-requisites: Physics 71, ES 1. Co-requisite: None. Credit: 3 units (3 hrs lecture).

IE 27 **Probability and Statistics for Industrial Engineering.** Applications of logic and probability in industrial engineering; random variables and their functions, descriptive statistics, discrete and continuous probability distributions and their applications. Sampling theory. Estimation and tests of hypotheses. Pre-requisites: None. Co-requisite: Math 23/Equivalent. Credit: 3 units (3 hrs lecture).

IE 28 **Statistical Analysis for Industrial Engineering.** Regression, correlation, analysis of variance, design of experiments and their applications in industrial engineering. Pre-requisite: IE 27. Co-requisite: None. Credit: 3 units (3 hrs lecture).

IE 31 **Industrial Organization and Management.** Basic features governing the organization, administration, and financing of industries. Relations between labor and management. Pre-requisite: None. Co-requisite: None. Credit: 3 units (3 hrs lecture).

- IE 32** **Work Study and Measurement.** Productivity concepts and techniques; method study and work measurement; wage payment; indirect and expense labor standards; training practices. Pre-requisites: IE 21, IE 27, IE 31. Co-requisite: None. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).
- IE 33** **Systems & Procedures.** Systems documentation and charting; introduction to information management and related ISO standards; systems and procedures best practices. Pre-requisite: None. Co-requisite: IE 32. Credit: 2 units (2 hrs lecture).
- IE 40** **Mathematical Methods for Industrial Engineering.** Theory and applications of linear algebra, differential equations, and numerical methods for Industrial Engineering. Pre-requisite: Math 22/Equivalent. Co-requisite: Math 23/Equivalent. Credit: 3 units (3 hrs lecture).
- IE 41** **Operations Research I.** Operations research methodology; optimization models for linear systems; linear programming; duality and sensitivity analysis; transportation, assignment, and network models. Pre-requisite: IE 40. Co-requisite: None. Credit: 3 units (3 hrs lecture).
- IE 50** **Engineering Economics for Industrial Engineering.** Concepts and tools of economic analysis for decision-making. Interest and money-time relationships. Single and multiple project evaluation. After-tax economy studies. Decisions recognizing risk and uncertainty. Pre-requisite: Acctg 1/Equivalent. Co-requisite: None. Credit: 3 units (3 hrs lecture).
- IE 70** **Computer Programming for Industrial Engineering.** Design and analysis of computational algorithms for Industrial Engineering problems. Pre-requisite: Math 21/Equivalent. Co-requisite: None. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).
- IE 135** **Quality Control.** Concept of quality, costs of quality, introduction to quality management systems. Pre-requisite: IE 28, IE 32. Co-requisite: None. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).
- IE 142** **Operations Research II.** Integer programming; dynamic programming; goal programming; game theory. Pre-requisites: IE 70/Equivalent, IE 41. Co-requisite: None. Credit: 2 units (2 hrs lecture).
- IE 143** **Stochastic Processes in Engineering.** Elements of stochastic processes; queuing theory and decision models; Markov chains,

renewal theory and its applications to engineering problems. Pre-requisite: IE 27. Co-requisite: None. Credit: 3 units (3 hrs lecture).

- IE 144 Systems Simulation.** Simulation of complex discrete event systems with applications in manufacturing and service organizations; random number and variate generation, input distribution modeling, statistical analysis of simulation output; case studies. Pre-requisites: IE 70/Equivalent, IE 28, IE 32. Co-requisite: None. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).
- IE 151 Production and Service Systems.** Capacity planning. Forecasting. Production planning. Scheduling and inventory control. Maintenance. Production Control. Production information system. Pre-requisites: IE 41, IE 50, IE 135. Co-requisite: None. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).
- IE 153 Project Development and Management.** Phases of project feasibility studies. Project development, evaluation and management. Pre-requisites: BA 115/Equivalent, IE 151. Co-requisite: None. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).
- IE 158 Supply Chain Management for Industrial and Service Systems.** An overview of concepts, processes, and best practices that are used in the management of supply chains. Supply chain management, procurement, customer relationship management, finance, information technologies, logistics activities and case studies. Pre-requisite: IE 151. Co-requisite: None. Credit: 3 units (3 hrs lecture).
- IE 162 Ergonomics I.** Origins and development of human factors and ergonomics. Physical ergonomics and the tools and techniques of physical ergonomic risk assessment, ergonomic workplace design and evaluation. Human factors research methods. Pre-requisites: IE 32, IE 28. Co-requisite: None. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).
- IE 163 Ergonomics II.** Introduction to cognitive ergonomics and relation of cognitive limitations to design of effective displays and controls. Human-computer interaction. Pre-requisite: IE 32, IE 28. Co-requisite: None. Credit: 2 units (1 hr lecture, 3 hrs laboratory).
- IE 171 Information Systems I.** Concepts and frameworks of information systems. Analysis and design of information systems. Pre-requisites: IE 70/Equivalent, IE 33. Co-requisite: IE 151. Credit: 3 units (3 hrs lecture).

- IE 172** **Information Systems II.** Implementation considerations in information systems design. Relational database systems. Pre-requisite: IE 171. Co-requisite: None. Credit: 3 units (3 hrs lecture).
- IE 193** **Industrial Engineering Practicum.** On-the-job training or industry internship. Pre-requisite: IE 151. Co-requisite: None. Credit: 2 units (100 hrs field).
- IE 194** **Industrial Engineering Capstone Project I.** Systems engineering design project proposal development. Problem identification and formulation. Pre-requisite: None. Co-requisites: IE 153. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).
- IE 195** **Industrial Engineering Capstone Project II.** IE undergraduate capstone project second course. Team-based systems engineering design project. Design solutions from a systems perspective. Pre-requisite: IE 194. Co-requisite: None. Credit: 3 units (1 hr lecture, 6 hrs laboratory).
- Engg 150** **Introduction to Technology Entrepreneurship.** Fundamentals of technology entrepreneurship, intellectual property, industry creation, and technology strategy. Opportunity recognition and evaluation. Business model development. Management of ventures. Pre-requisite: Senior Standing. Co-requisite: None. Credit: 3 units (3 hrs lecture).

C. Approved IE Electives

- IE 122** **Product Design & Development.** Framework for product life cycle design, integrated product & process design, development, prototyping & evaluation. Pre-requisite: IE 21. Co-requisite: Shop 7. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).
- IE 136** **Manufacturing Systems.** Primary activities of a manufacturing firm. Manufacturing practices. Pre-requisite: Fourth Year Standing. Co-requisite: None. Credit: 3 units (3 hrs lecture).
- IE 138** **Manufacturing Management.** Organizational & financial aspects of manufacturing. Manufacturing management principles. Pre-requisite: Fourth Year Standing. Co-requisite: None. Credit: 3 units (3 hrs lecture).
- IE 139** **Reliability Engineering for Industrial Systems.** Basic concepts of reliability engineering. Reliability measurement system. Reliability

analysis methods. Failure mode and effects analysis. Fault tree analysis. Risk analysis. Human reliability. Life testing, Reliability testing and evaluation. Design for reliability applications. Pre-requisites: IE 135, IE 143. Co-requisite: None. Credit: 3 units (3 hrs lecture).

IE 152 **Manufacturing Planning and Design.** Manufacturing process design. Location & layout of facilities. Materials flow systems. Materials handling. Storage & distribution. Pre-requisite: IE 151. Co-requisite: IE 144. Credit: 3 units (3 hrs lecture).

IE 161 **Safety & Health Management.** Hazard analysis techniques, human error analysis, safety standards & hazard communication; application of human factors & engineering practice in accident prevention & the reduction of health hazards on living & work environment. Pre-requisite: IE 160 or COI. Co-requisite: None. Credit: 3 units (3 hrs lecture).

IE 173 **Data Analytics for Industrial Engineering.** Overview of data analytics and data mining. Design of end-to-end data mining processes, current methodologies and best practices used to transform raw data into useful information to support decision making. Pre-requisites: IE 171 Information Systems I or equivalent, and IE 27 or equivalent. Co-requisite: None. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).

IE 174 **Software Tools for Industrial Engineering.** Introduction to computer software packages for Industrial Engineering applications. Pre-requisite: ES 26, COI. Co-requisite: None. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).

IE 197 **Special Topics.** Credit: 3 units (3 hrs lecture).

IE 198 **Special Problems.** Pre-requisite: Senior standing. Credit: 3 units (3 hrs lecture).

D. Cognate Courses

ES 1 **Engineering Drawing.** Technical sketching, lettering, instrumental drawing. Multiview projections. Pictorial drawing. Conventions and dimensioning. Graphs and charts. Pre-requisites: None. Co-requisite: None. Credit: 2 units (6 hrs laboratory).

ES 101 **Mechanics of Particles and Rigid Bodies.** Force, moment, and motion concepts. Newton's Laws of Motion. Analysis of particles and rigid bodies in static and dynamic equilibrium using vector mechanics,

momentum methods, and energy methods. Geometric properties to lines, areas, and volumes. Pre-requisites: Math 22/Equivalent. Co-requisite: None. Credit: 4 units (3 hrs lecture, 3 hrs laboratory).

- ES 102** **Mechanics of Deformable Bodies.** Internal forces and moments in members subjected to different loadings. Material properties. Deformation, strain and stress analysis and design of members subjected to axial, torsional, shear, and flexural loads. Stress transformations using equilibrium and Mohr's circle. Theories of material failure. Pre-requisites: ES 101. Co-requisite: None. Credit: 3 units (3 hrs lecture).
- ChemE 2** **Elementary Chemical Engineering.** Introduction to chemical engineering calculations; elementary mass and energy balances for common unit operations and unit processes. Pre-requisites: None. Co-requisite: None. Credit: 3 units (3 hrs lecture).
- EEE 3** **Elementary Electrical Engineering.** Fundamentals of electric and magnetic circuits; transformers; direct and alternating current machinery; elementary distribution systems and electrical wiring. Pre-requisites: Math 22/Equivalent, and Physics 72. Co-requisite: None. Credit: 3 units (3 hrs lecture).
- ME 63** **Thermodynamics.** First and second laws of thermodynamics. Properties of thermodynamic media. Ideal gases. Thermodynamic cycles. Pre-requisites: Math 22/Equivalent, and Physics 72. Co-requisite: None. Credit: 3 units (2 hrs lecture, 3 hrs laboratory).
- Acctg 1** **Introduction to Financial Accounting.** Accounting concepts and principles applied to service, merchandising, and manufacturing operations; partnerships and corporations; the analysis, interpretation, and uses of accounting data for management. Pre-requisites: None. Co-requisite: None. Credit: 3 units (3 hrs lecture).
- BA 115** **Management Accounting.** Uses of accounting information for managerial planning and control. Pre-requisites: Acctg 1/Equivalent. Co-requisite: None. Credit: 3 units (3 hrs lecture).
- Shop 7** **General Shop Practice.** The use of equipment for machining, welding, casting, and allied practices. Pre-requisites: None. Co-requisite: None. Credit: 1 unit (3 hrs laboratory).

6.2 PROGRAM OF STUDY

A. Curriculum Checklist

BS IE Curriculum Checklist

FIRST YEAR			
First Semester		Second Semester	
Subjects	Credit	Subjects	Credit
Math 21*	4	Math 22	4
Physics 71	4	Physics 72	4
Physics 71.1	1	Physics 72.1	1
GE 1: Fil 40	3	ES 1	2
GE 2: Philo 1	3	IE 70	3
GE 3: Speech 30	3	IE 31	3
PE	(2)	GE 4: Eng 13	3
	18	PE	(2)
			20
SECOND YEAR			
First Semester		Second Semester	
Subjects	Credit	Subjects	Credit
Math 23	4	IE 28	3
IE 21	3	IE 32	3
IE 27	3	IE 33	2
IE 40	3	IE 41	3
Acctg 1	3	IE 50	3
Shop 7	1	ES 101	4
GE 5: KAS 1	3	PE	(2)
PE	(2)	NSTP	(3)
NSTP	(3)		18
	20		
THIRD YEAR			
First Semester		Second Semester	
Subjects	Credit	Subjects	Credit
IE 135	3	IE 144	3
IE 142	2	IE 151	3
IE 143	3	IE 163	2
IE 162	3	BA 115	3
GE 6: GE Elective	3	ME 63	3
GE 7: Econ 11	3	IE 171	3
ES 102	3	GE 8: Soc Sci 1/2	3
	20		20
MIDYEAR TERM			

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Date: 15 OCT 2025

Subject IE 193		Credit 2	
FOURTH YEAR			
First Semester		Second Semester	
Subjects	Credit	Subjects	Credit
IE 153	3	Engg 150	3
IE 158	3	ChemE 2	3
IE 172	3	IE 195	3
IE 194	3	Elective	3
IE Elective	3	PI 100	3
EEE 3	3	GE 10: STS 1	3
GE 9: ARTS 1	3		18
	21		

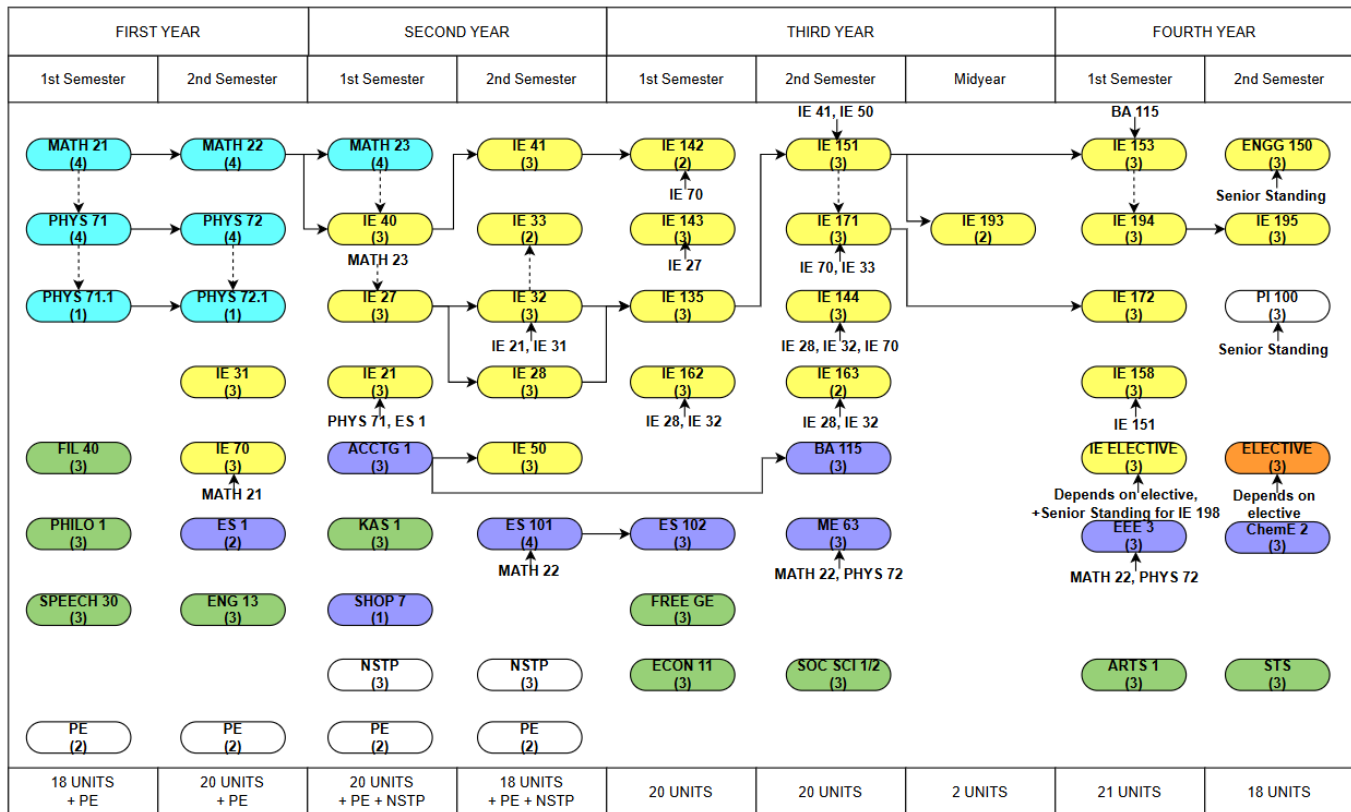
*All students required to take Math 21 must have passed any of the following:
(1) High School Basic Calculus from the STEM or equivalent strand of K-12;
(2) the Validation Examination for Math 20 (Pre-Calculus: Functions and their Graphs) administered by the UPD Institute of Mathematics; or (3) Math 20 as a non-credit course.

As a requirement for graduation, all students must take (6) units in one of the National Service Training Program (NSTP)_components: Civic Welfare Training Service (CWTS), Literacy Training Service (LTS), and Reserved officers' Training Corps Military Science (ROTC Mil Sci). These are offered by UPD.

B. Curriculum Flowchart

BS IE STEM Strand Curriculum Flowchart

BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING

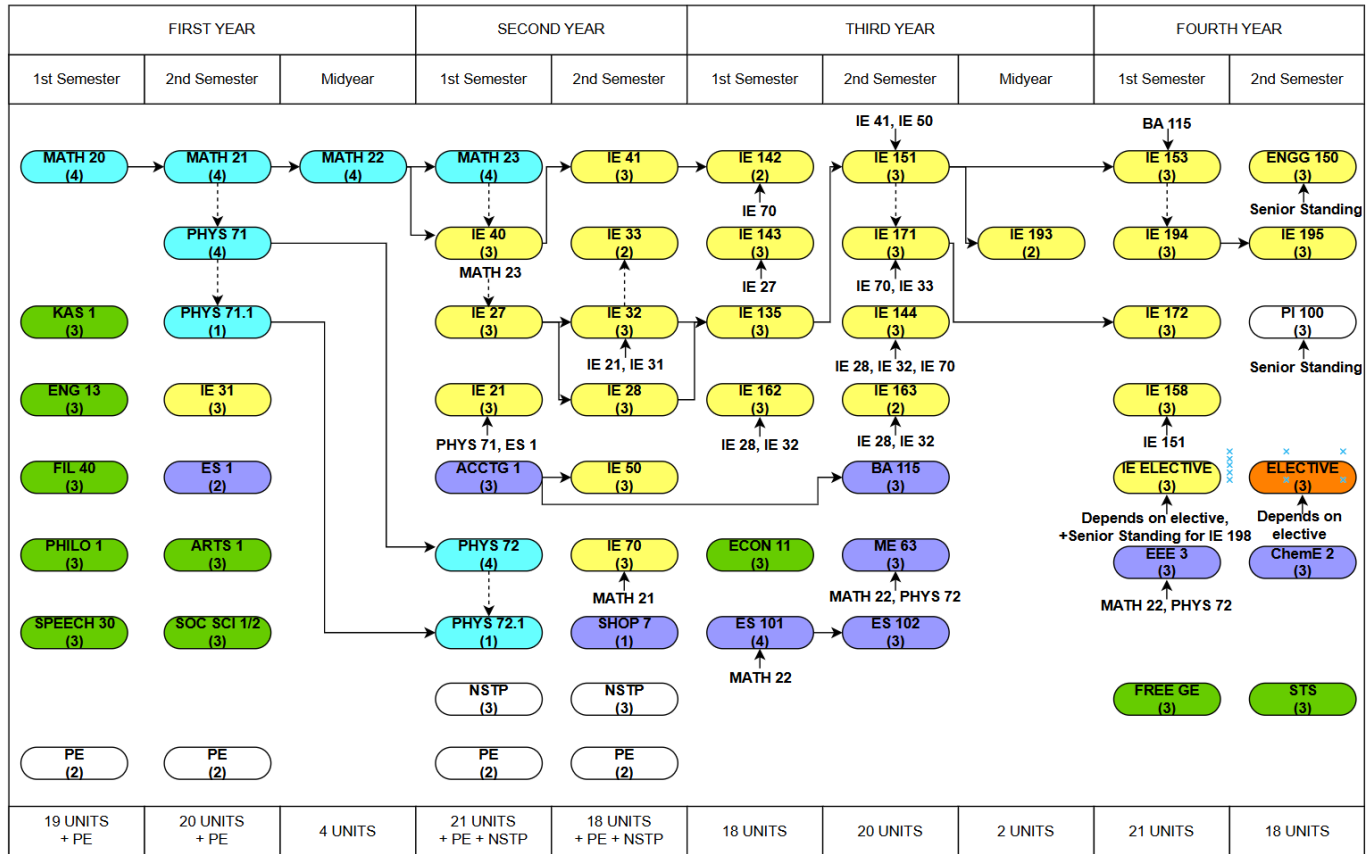


Total no. of units = 157 (+ PE + NSTP)
Version 9.0 (last updated June 27, 2026)

Prerequisite →
Co-requisite - - - - ->

BS IE Non-STEM Strand Curriculum Flowchart

BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING (NON-STEM STRAND)



Total no. of units = 161 (+ PE + NSTP)

Version 9.0 (last updated June 27, 2026)

Prerequisite —————→
Co-requisite - - - - -→

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