UW University of Washington Office of the President, Box 351230

December 15, 2003

Dean Denice D. Denton
College of Engineering
Box 352180

Dear Denice:

Based upon the recommendation of its Subcommittee on Admissions and Programs, the Faculty Council on Academic Standards has recommended approval of the revised program requirements for a Bachelor of Science degree in Industrial Engineering. A copy of the changes is attached.

I am writing to inform you that the Department of Industrial Engineering is authorized to specify these requirements beginning autumn quarter 2004.

The new requirements should be incorporated in printed statements and in individual department websites as soon as possible. The *General Catalog* website will be updated accordingly by the Registrar's Office.

Sincerely yours,

LEE

Lee L. Huntsman
President

Enclosure

cc: Professor Chen-Ching Liu (with enclosure)
Mr. W. W. Washburn (with enclosure)
Mr. Robert Corbett (with enclosure) INDE -100803

IND E - 100803

Creating & Changing Undergraduate Academic Programs

College: Engineering **Department or Unit:** Industrial Engineering **Date:** _____

New Programs

☐ Leading to a Bachelor of _____ *in* _____ *degree*
☐ Leading to a Bachelor of _____ *degree with a major in* _____
☐ Leading to a _____ Option *within the existing major in* _____
☐ Leading to a Minor *in* _____

Changes to existing programs

☐ New Admission Requirements for the Major *in* _____ *within the Bachelor of* _____
☐ Revised Admission Requirements for the Major *in* _____ *within the Bachelor of* _____
X Revised Program Requirements for the Major *in* Industrial Engineering *within the Bachelor of Science in Industrial Engineering*
☐ Revised Requirements for the Option *in* _____ *within the major in* _____
☐ Revised Requirements for the Minor *in* _____

Other Changes

☐ Change name of program *from* _____ *to* _____
☐ New or Revised Continuation Policy *for* _____
☐ Eliminate program *in* _____

Proposed Effective Date: *(quarter/year)* : Autumn 2004

Contact Person	Phone Number	Email
DJ Miller	543-5041	mrmiller@u.washington.edu

1. Explanation of and Rationale for Proposed Change: (*Please use additional pages if necessary. For new programs, please include any relevant supporting documentation such as student learning outcomes, projected enrollments, letters of support, and departmental handouts.)*

Internal and external reviews of the IE undergraduate curriculum (including an ABET accreditation review and Program Review) have indicated that it was too rigid, with too many required courses and too few electives. Following an internal review of the curriculum and a benchmarking study of other top Industrial Engineering undergraduate curricula, this new, more flexible curriculum has been designed. It maintains the basic goals of providing a broad and comprehensive set of requirements, while providing students with more flexibility to pursue areas within IE of personal interest. The IE faculty, student advisory board and the visiting committee all have endorsed this new curriculum.

* *For information about when and how to use this form please go to http://www.washington.edu/faculty/facsenate/councils/fcas/1503/.*

2. Catalog Copy

A. Catalog Copy as Currently Written *(Include only sections/paragraphs that would be changed if your request is approved. Please cross out or otherwise highlight any deletions.)*

Graduation Requirements

~~*Program Requirements:* Courses required for the B.S.I.E. degree include a core of 38 credits of specified industrial engineering courses normally taken after admission to the program, 23 credits of technical electives including at least 7 credits from specified IND E courses, and 35 credits of fundamental courses representing several engineering disciplines. The B.S.I.E. degree also requires 54 credits of specific courses in mathematics, physical sciences, and communications, as well as 30 credits in humanities and social science.~~

B. Proposed Catalog Copy, Reflecting Requested Changes *(Include exact wording as you wish it to be shown in the printed catalog. Please underline or otherwise highlight any additions. If needed, attach a separate, expanded version of the changes that might appear in department publications.)*

Graduation Requirements

Mathematics (24 credits): MATH 124, 125, 126, 307, 308, and IND E 315.

Science (25 credits): CHEM 142, 152; PHYS 121, 122, 123

Written and Oral Communication (12 credits): 5-credit course in English Composition from the University-approved list; T C 231, 333.

Visual, Literary & Performing Arts (VLPA) and Individuals & Societies (I&S) (30 credits): A minimum of 10 credits is required in each area.

Engineering Fundamentals (28 credits): CSE 142, MSE 170, AA 210, EE 215, CEE 220, ME 230, IND E 250.

Industrial Engineering Core (19 credits): IND E 237, 316, 324, 325, 494, 495

Technical Electives (42 credits): At least one class from approved courses in each of the following areas; operations research, statistics, production/operations, design, and general engineering. A minimum of 21 credits must be completed in courses offered by units in the College of Engineering. The list of approved technical electives is available from the department advising office.

3. Signatures *(required)*

Chair/Program Director	Date 11/26/03	Dean	Date 12/1/03
College Committee	Date 12/1/03	Faculty Council on Academic Standards	Date 12/5/03

Following an extensive review process involving faculty and constituents, including students (through the Student Advisory Board) and industry (through the Visiting Committee), the undergraduate curriculum has been redesigned and approved. It is scheduled to take effect Autumn Quarter 2004. The new curriculum is shown below, followed by the current curriculum.

The new curriculum has substantially reduced the number of required courses (from 12 to 6) and the number of required credits (from 38 to 19). The number of technical elective credits has increased from 23 to 42 to maintain the same total credit hour requirement for graduation (180 credits). Of the technical elective credits required, a maximum of 14 are required from Industrial Engineering courses, compared to 11 previously. The total number of credits that must be taught in any one year to permit students to successfully complete their program of study is the sum of the required Industrial Engineering course credits and the minimum required Industrial Engineering technical elective credits. Therefore, under the new plan, the total credit load required to be taught per year in undergraduate Industrial Engineering courses has been reduced from 49 credits to 33 credits. Additional Industrial Engineering technical elective courses will be offered subject to availability of regular, adjunct and affiliate faculty, as well as visiting faculty.

New:

Bachelor of Science in Industrial Engineering Graduation Requirements

Mathematics.....[24 credits]

- ♦ MATH 124 (or 127)* [5cr] Calculus with Analytic Geometry I
- ♦ MATH 125 (or 128)* [5cr] Calculus with Analytic Geometry II
- ♦ MATH 126 (or 129)* [5cr] Calculus with Analytic Geometry III
- MATH 307 [3cr] Intro to Differential Equations *[pr: MATH 125]*
- MATH 308 [3cr] Linear Algebra with Applications *[pr: MATH 126]*
- IND E 315 [3cr] Prob. & Statistics for Engineers *[pr: MATH 307]*

**The sequence of MATH 127, 128, 129 may be taken in lieu of 124, 125, 126.*

Physical Sciences.....[25 credits]

- ♦ CHEM 142 [5cr] General Chemistry with lab
- ♦ CHEM 152 [5cr] General Chemistry with lab *[pr: CHEM 142]*
- ♦ PHYS 121* [5cr] Mechanics with lab *[pr: MATH 124]*
- ♦ PHYS 122* [5cr] Electro/ Oscillatory with lab *[pr: MATH 125]*
- ♦ PHYS 123* [5cr] Waves with lab *[pr: MATH 126]*

**The accompanying lab sections to PHYS 121, 122, 123 must be completed*

Written and Oral Communications.....[12 credits]

- ♦ ENGL COMP [5cr] University English Composition requirement
- TC 231 [3cr] Intro to Technical Writing *[pr: ENGL COMP]*
- TC 333 [4cr] Adv. Tech Writing/Oral Present *[pr: TC 231]*

Visual, Literary & Performing Arts/Individuals & Society [VLPA/I&S].....[30 credits]

Minimum 10 credits in VLPA required.
Minimum 10 credits in I&S required.

General Engineering/Computing Courses.....[28 credits]

- CSE 142 [4cr] Computer Programming for Engineers
- MSE 170 [4cr] Fund of Material Science *[pr: CHEM 152]*
- AA 210 [4cr] Engineering Statics *[pr: MATH 126, PHYS 121]*
- EE 215 [4cr] Fund. of Electrical Engineering *[pr: PHYS 122, MATH 126]*
- CEE 220 [4cr] Intro to Mechanics of Material *[pr: AA 210]*
- ME 230 [4cr] Kinematics & Dynamics *[pr: AA 210]*
- IND E 250 [4cr] Fund. of Engineering Economy

Industrial Engineering Required Core Courses.....[19 credits]

- IND E 237 [3cr] Intro to Manufacturing Systems
- IND E 316 [3cr] Design of Experiments *[pr: IND E 315]*
- IND E 324 [3cr] Applications of Linear Programming *[pr: MATH 308, CSE 142]*
- IND E 325 [3cr] Nonlinear Programming & Stochastic Models *[pr: IND E 315, IND E 324]*
- IND E 494 [4cr] Design in the Manufacturing Firm *[pr: TC 333, IND E 237]*
- IND E 495 [3cr] IE Senior Design *[pr: IND E351 & 494]*

Technical Electives.....[minimum 42 credits]

Complete a minimum of 42 credits, including **AT LEAST** one course from **EACH** of the following 5 categories:

A. Operations Research:
- IND E 326 [3cr] Methods of Operations Research *[pr: IND E 325]*
- IND E 424 [4cr] Simulation *[pr: IND E 237 &325; 325 may be taken concurrently]*

B. Statistics:
- IND E 421 [3cr] Statistical Quality Control *[pr: IND E 315]*
- IND E 426 [3cr] Reliability Engineering & System Safety *[pr: IND E 315]*

C. Production/Operations:
- IND E 430 [4cr] Manufacturing Scheduling& Inventory *[pr: IND E 237 &325]*
- IND E 433 [3cr] Intro Computational Manufacturing *[pr: IND E 237 & 324]*
- IND E 439 [4cr] Plant Layout & Material Handling

D. Design:
- IND E 351 [3cr] Human Factors
- IND E 455 [3cr] User Interface Design *[pr: IND E 316]*

E. General Engineering:
- CHEME 260 [4cr] Thermodynamics *[pr: CHEM 142, MATH 126, PHYS 121]*
- CSE 143 [5cr] Computer Programming for Engineers II *[pr: CSE 142]*

Additional technical elective courses may also be chosen from the approved Undergraduate Technical Elective List. Refer any questions to the IE Advisor.

Total credits required for Graduation.....180

♦ -- Upper Division Admission Requirement
[pr] -- Prerequisite course(s)

Early Admission Requirements:
~Must be enrolled at UW w/ at least 15cr earned at UW
~Autumn Quarter option ONLY
~Must complete: MATH 124, 125, 126 or equiv;
10 cr of Physical Science requirements;
5 cr ENGL COMP

New:

Industrial Engineering Undergraduate Technical Electives List (Revised 9/24/03)

Complete a minimum of 42 credits, including AT LEAST one course from EACH of the following 5 categories:

A. Operations Research:

IND E 326 [3cr] Methods of Operations Research *[pr: IND E 325]*

IND E 424 [4cr] Simulation *[pr: IND E 237 &325; 325 may be taken concurrently]*

B. Stats:

IND E 421 [3cr] Statistical Quality Control *[pr: IND E 315]*

IND E 426 [3cr] Reliability Engineering & System Safety *[pr: IND E 315]*

C. Production/Operations:

IND E 430 [4cr] Manufacturing Scheduling& Inventory *[pr: IND E 237 &325]*

IND E 433 [3cr] Intro Computational Manufacturing *[pr: IND E 237 & 324]*

IND E 439 [4cr] Plant Layout & Material Handling

D. Design:

IND E 351 [3cr] Human Factors

IND E 455 [3cr] User Interface Design *[pr: IND E 316]*

E. General Engineering:

CHEME 260 [4cr] Thermodynamics *[pr: CHEM 142, MATH 126, PHYS 121]*

CSE 143 [5cr] Computer Programming for Engineers II *[pr: CSE 142]*

Additional technical elective courses may be chosen from the list below to reach the minimum 42 credits.

Use the "Request for a Technical Elective Course" on the back of this form to request approval of a course not included below.

Course	No.	Title	Cr.
ACCTG	401	Fed. Income Tax Factors in Business Decisions	3
CERE	421	Ceramic Processing	4
CHEME	260	Thermodynamics	4
CHEME	355	Biological Frameworks for Engineers	3
CHEME	471	Pulping & Bleaching Processes	3
CHEME	472	Papermaking Processes	3
CEE	306	Construction Engineering	3
CEE	350	Environ. Engr: Water & Air Quality	4
CEE	363	Constructional Materials	4
CEE	405	Construction Planning & Sched.	3
CEE	410	Traffic Engineering Fund & Surveys	3
CEE	413	Transportation Tech. & Systems	3
CEE	430	Issues in Professional ENGR Practice	3
CEE	461	Bio. Problems in Water Pollution	3:5
CEE	486	Water-Quality Analysis	3
CEE	493	Air-Pollution Source Testing/Equip. Eval.	3
CEE	494	Air-Pollution Control Equip, Design	3
CSE	143	Computer Prog. for Engineers II	5
CSE	373	Data Structures and Algorithms	3
CSE	410	Computer Systems	3

Course	No.	Title	Cr.
IND E	439	Plant Layout & Material Handling	4
IND E	455	User Interface Design	3
IND E	496	Entrepreneurship	3
IND E	498	Special Topics in Industrial Engineering	var
IND E	499	Special Projects (6 credits max)	var
IND E	5xx	All IND E Graduate Level Courses	var
IS	300	Intro to Information Systems	5
IS	480	Intro to Database Mgt	4
MATH	309	Linear Analysis	3
MATH	324	Advanced Calculus 1	3
MATH	326	Advanced Calculus 2	3
MATH	327	Intro to Real Analysis 1	3
MATH	394	Probability 1	3
MATH	395	Probability 2	3
MATH	396	Probability 3	3
MATH	407	Linear Optimization	3
MATH	408	Nonlinear Optimization	3
MATH	409	Discrete Optimization	3
MATH	491	Special Topics-Probability (Intro Stochast Processes)	3
MATH	492	Special Topics-Probability (Intro Stochast Processes)	3

CSE	415	Intro to Artificial Intelligence	5
EE	371	Intro to Digital Systems & Computers	4
EE	383	Semi-conductor Materials & Devices	4
EE	415	Comp.-Aided System Analysis & Design	3
EE	457	Electric Energy Distribution Systems	4
ENGR	100	Intro to Engr Design (only if taken as Frosh/Soph)	5
ENGR	499	Honors	3
ENVH	457	Industrial & Environmental Noise	3
FM	320	Intro to Marketing and Human Resources	3
FM	321	Intro to Finance and Accounting	3
IND E / ME	295	Product Dissection	3
IND E	326	Methods of Operations Research	3
IND E	351	Human Factors	3
IND E	421	Statistical Quality Control	3
IND E	424	Simulation	4
IND E	426	Reliability	3
IND E	430	Scheduling and Inventory	4
IND E	431	Computer Integrated Manufacturing	4
IND E	433	Intro Computational Manufacturing	3

ME	354	Behavior of Engineering Materials	5
ME	355	Manufacturing Processes	4
ME	373	Intro to Systems Dynamics	4
ME	374	Systems Dynamic Analy. & Design	5
ME	403	Material-Removal Processes	3
ME	409	IntroNum. Control/Comp.Aid. Mfg	3
ME	428	Noise Control	3
ME	480	Intro to Computer-Aided Technology	4
ME	490	Naval Architecture	3
MGMT	323	Business Ethics/Corporate Social Responsibility	4
MGMT	401	Leadership, Critical Thinking, & Decision Making	4
MGMT	402	Deal-Making and Negotiations	4
MGMT	403	Motivating High Performance	4
MGMT	404	Organization Development and Change	4
MGMT	413	Labor Law and Collective Bargaining	4
MGMT	422	Protecting Intellectual Property in Global Economy	2
METE	464	Extractive Process Analysis	3
OPMGT	443	Inventory/Materials Management	4
QMETH	450	Spreadsheet Models	4

Current:

Mathematics [24 credits]

- ♦ MATH 124 (or 127)* [5cr] Calculus with Analytic Geometry I
- ♦ MATH 125 (or 128)* [5cr] Calculus with Analytic Geometry II
- ♦ MATH 126 (or 129)* [5cr] Calculus with Analytic Geometry III
- MATH 307 [3cr] Intro to Differential Equations *[pr: MATH 125]*
- MATH 308 [3cr] Linear Algebra with Applications *[pr: MATH 126]*
- IND E 315 [3cr] Prob. & Statistics for Engineers *[pr: MATH 307]*

**The sequence of MATH 127, 128, 129 may be taken in lieu of 124, 125, 126.*

Physical Sciences [25 credits]

- ♦ CHEM 142 [5cr] General Chemistry with lab
- ♦ CHEM 152 [5cr] General Chemistry with lab *[pr: CHEM 142]*
- ♦ PHYS 121* [5cr] Mechanics with lab *[pr: MATH 124]*
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- ♦ PHYS 123* [5cr] Waves with lab *[pr: MATH 126]*

**The accompanying lab sections to PHYS 121, 122, 123 must be completed*

Written and Oral Communications [12 credits]

- ♦ ENGL COMP [5cr] University English Composition requirement
- TC 231 [3cr] Intro to Technical Writing *[pr: ENGL COMP]*
- TC 333 [4cr] Adv. Tech Writing/Oral Present *[pr: TC 231]*

Visual, Literary & Performing Arts/Individuals & Society [VLPA/I&S] [30 credits]

Minimum 10 credits in VLPA required.
Minimum 10 credits in I&S required.

General Engineering/Computing Courses [28 credits]

- CSE 142 [4cr] Computer Programming for Engineers
- MSE 170 [4cr] Fund of Material Science *[pr: CHEM 152]*
- AA 210 [4cr] Engineering Statics *[pr: MATH 126, PHYS 121]*
- EE 215 [4cr] Fund. of Electrical Engineering *[pr: PHYS 122, MATH 126]*
- CEE 220 [4cr] Intro to Mechanics of Material *[pr: AA 210]*
- ME 230 [4cr] Kinematics & Dynamics *[pr: AA 210]*
- IND E 250 [4cr] Fund. of Engineering Economy

Industrial Engineering Core Courses [38 credits]

- IND E 237 [3cr] Intro to Manufacturing Systems
- IND E 316 [3cr] Design of Experiments *[pr: IND E 315]*
- IND E 324 [3cr] Applications of Linear Programming *[pr: MATH 308, CSE 142]*
- IND E 325 [3cr] Nonlinear Programming & Stochastic Models *[pr: IND E 315, IND E 324]*
- IND E 351 [3cr] Human Factors
- IND E 421 [3cr] Statistical Quality Control *[pr: IND E 315]*
- IND E 424 [4cr] Simulation *[pr: IND E 237 &325; 325 may be taken concurrently]*
- IND E 426 [3cr] Reliability Engineering & System Safety *[pr: IND E 315]*
- IND E 433 [3cr] Intro Computational Manufacturing *[pr: IND E 237 & 324]*
- IND E 455 [3cr] User Interface Design *[pr: IND E 316]*
- IND E 494 [4cr] Design in the Manufacturing Firm *[pr: TC 333, IND E 237]*
- IND E 495 [3cr] IE Senior Design *[pr: IND E351 & 494]*

Technical Electives [23 credits]

Complete 23 credits from the approved Undergraduate Technical Elective list.

Of these 23 credits, the following requirements must be met:

Complete at least one: IND E 430 (4cr), IND E 439 (4cr)
Complete at least one: CHEME 260 (4cr), CSE 143 (5cr)
Complete at least 7cr of IND E courses on the Undergraduate Technical Elective list.
(these 7cr can include IND E 430 and/or IND E 439)

Total credits required for Graduation: 180

♦ -- Upper Division Admission Requirement
[pr] -- Prerequisite course(s)

Early Admission Requirements:
-Must be enrolled at UW w/ at least 15cr earned at UW
-Autumn Quarter option ONLY
-Must complete: MATH 124, 125, 126 or equiv;
10 cr of Physical Science requirements;
5 cr ENGL COMP

From April 2001:

Industrial Engineering Undergraduate Technical Electives List (Revised 4/21/01)

Complete 23 credits of approved Undergraduate Technical Electives from this list.

Of these 23 credits, the following requirements must be met::

Complete at least one: IND E 430 (4cr), IND E 439 (4cr)
Complete at least one: CHEME 260 (4cr), CSE 143 (5cr)
Complete at least 7cr of IND E courses on the list (can include IND E 430 and/or IND E 439

Course	No.	Title	Cr.
CERE	421	Ceramic Processing	4
CHEME	260	Thermodynamics	4
CHEME	471	Pulping & Bleaching Processes	3
CHEME	472	Papermaking Processes	3
CEE	306	Construction Engineering	3
CEE	350	Environ. Engr: Water & Air Quality	4
CEE	363	Constructional Materials	4
CEE	405	Construction Planning & Sched.	3
CEE	410	Traffic Engineering Fund & Surveys	3
CEE	413	Transportation Tech. & Systems	3
CEE	430	Issues in Professional ENGR Practice	3
CEE	461	Bio. Problems in Water Pollution	3:5
CEE	486	Water-Quality Analysis	3
CEE	493	Air-Pollution Source Testing/Equip. Eval.	3
CEE	494	Air-Pollution Control Equip. Design	3
CSE	143	Computer Prog. for Engineers II	5
CSE	373	Data Structures and Algorithms	3
CSE	410	Computer Systems	3
CSE	415	Intro to Artificial Intelligence	5
EE	371	Intro to Digital Systems & Computers	4
EE	383	Semi-conductor Materials & Devices	4
EE	415	Comp.-Aided System Analysis & Design	3
EE	457	Electric Energy Distribution Systems	4
ENGR	100	Intro to Engr Design (only if taken as Frosh/Soph)	5
ENGR	499	Honors	3
ENVH	457	Industrial & Environmental Noise	3
FM	320	Intro to Marketing and Human Resources	3
FM	321	Intro to Finance and Accounting	3
IND E	280	Intro to System Engineering	4
IND E / ME	295	Product Dissection	3
IND E	326	Methods of Operations Research	3
IND E	392	Concurrent Engineering	3

Course	No.	Title	Cr.
IND E	430	Scheduling and Inventory	4
IND E	431	Computer Integrated Manufacturing	4
IND E	439	Plant Layout & Material Handling	4
IND E	496	Entrepreneurship	3
IND E	498	Special Topics in Industrial Engineering	var
IND E	499	organized courses, or up to 6cr Special Projects	var
IND E	5xx	All IND E Graduate Level Courses	var
IS	300	Intro to Information Systems	5
IS	480	Intro to Database Mgt	4
MATH	309	Linear Analysis	3
MATH	324	Advanced Calculus 1	3
MATH	326	Advanced Calculus 2	3
MATH	327	Intro to Real Analysis 1	3
MATH	394	Probability 1	3
MATH	395	Probability 2	3
MATH	396	Probability 3	3
MATH	407	Linear Optimization	3
MATH	408	Nonlinear Optimization	3
MATH	409	Discrete Optimization	3
ME	354	Behavior of Engineering Materials	5
ME	355	Manufacturing Processes	4
ME	373	Intro to Systems Dynamics	4
ME	374	Systems Dynamic Analy. & Design	5
ME	403	Material-Removal Processes	3
ME	409	IntroNum. Control/Comp.Aid. Mfg	3
ME	428	Noise Control	3
ME	480	Intro to Computer-Aided Technology	4
ME	490	Naval Architecture	3
METE	464	Extractive Process Analysis	3
OPMGT	443	Inventory/Materials Management	4
QMETH	450	Spreadsheet Models	4