Engineering Faculty Document 38-06
March 8, 2007

To: The Engineering Faculty
From: The Department of Engineering Education
Date: March 8, 2007
Subject: Changes in Graduation Requirements for IDE BSE Degree

Following consultation with the Engineering Education Industrial Advisory Council, the Department of Engineering Education (ENE) has approved the following new degree requirements for the Bachelor of Science in Engineering (BSE) degree. This action is now submitted to the Engineering Faculty with a recommendation for approval.

BACKGROUND: Based on EFD 16-04 ENE has authority to offer as part of its Undergraduate Degree Programs a BSE degree in Interdisciplinary Engineering. EFD 16-04 was based on the first year program in engineering in effect in 2004 and did not incorporate the changes from EFD 39-04. ENE plans to seek accreditation of this program from ABET.

SUMMARY OF PROPOSED CHANGES: The BSE degree requirements are identical to the requirements of the BSE degree approved in EFD 16-04 except the new first year program replaces the old program, a communications selective is added, one credit of CHEM 116 will count as a lab selective, the credit hours of EPICS required when it is used as a major design experience course is reduced from 4 to 3, and IDE 400 (0 credits) is removed. Note that the required 124 credits for graduation are unchanged.

Current Degree Requirements: See Attachment A

Proposed Degree Requirements: See Attachment B

Example Plan Of Study under the Proposed Degree Requirements: See Attachment C.

EFFECTIVE DATE: These rules will be effective for students entering Purdue University in May 2006 and later.

REASON: Changes in the degree requirements are necessary to reflect the new first year requirements from EFD 39-04. Since Com 114 is no longer required in the first year, a Communications Selective was added to the curriculum. Since either CHEM 116 (4) or CS 159 (3) fulfill the science selective requirement in the first year engineering program, there is an "extra" credit of laboratory instruction in CHEM 116. This one credit will be used as part of the laboratory selective in the IDE BSE plan of study. Discussions with the staff of EPICS indicated that 3 credits of EPICS are sufficient for a major design experience course. A 3 credits EPICS major design experience course will match the 3 credits of the other option, IDE 485. The IDE 400 Professional Seminar was accidentally included in EFD 16-04 and is now removed. This seminar is not appropriate for all IDE students.

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Head
Department of Engineering Education

Attachment A

Current Degree Requirements for Bachelor of Science in Engineering (BSE) Degree in Interdisciplinary Engineering (IDE).

Credits

First Year Engineering Program 32-33
MA 165 & 166 or 161 & 162 or equivalent.
CHM 115 and 116 or equivalent
Phys 152 or equivalent
ENGL 106 or 108 or equivalent
COM 114 or equivalent
ENGR 100/103 and 106 or equivalent
CS 156 or equivalent
If the common first year program in engineering is changed, the BSE requirements will be changed to reflect these changes.

Required sophomore mathematics: Multivariate calculus (MA 261), and linear algebra & differential equations, MA 262 or (MA 265 & 266), or equivalent 8-10

Science selective. One of the following: Phys 241, Phys 261, Biol 121, Biol 295E, organic chemistry or equivalent. May be specified in individual plan of study. 3-4

Statistics selective. One of the following: IE 230, IE 330, ChE 320, STAT 350, STAT 511 or equivalent. The engineering courses count towards the required 47 credits in engineering. The Statistics courses count towards the Area requirements. (3 – counted elsewhere)

General Education: Follows Engineering's General Education Program requirements. 18
Individual plans of study may recommend particular general education courses.

Engineering: Minimum 47 credits at 200+ levels, of which at least 18 credits are at 300 + levels. Maximum number of credits in any one engineering discipline is 24.

Required Engineering Core:

Topic:	**Example Courses:**	**Credits**
Electrical circuits	ECE 201 or equivalent	3
Statics and Dynamics	ME 270, A&AE 203, (CE 297 + 298) or equivalent	3 or 6
Thermodynamics	ME 200, ABE 210, ChE 211 or equivalent	3
Engineering Economics	IE 343 or equivalent	3
Fluid mechanics	ME 309 (1 cr. counts as lab), CE 340, ChE 377 or equivalent	3
Capstone design	EPICS (senior design option) 2+2 or IDE 485	4 or 3
Professional Preparation	IDE 301 (Changed by Registrar from 300) (no substitution allowed)	1
Professional Seminar	IDE 400	0
	Typical Engineering Core total credits	19-23

Engineering Selectives: Do parts a, b, and c.
a. Three additional credits of engineering design. Must be approved by Dept. Engineering Education (Example courses: ABE 330, ABE 435, A&AE 251, CE 453, CE 470, IE 386, ME 263, or EPICS if take IDE 485 as capstone design). Must be completed before taking capstone design course(s). 3
b. Three credits of hands-on (not computer) laboratory. At least 2 credits must be in engineering (Example courses: A&AE 204L, A&AE 352L, A&AE 364L, ECE 207, ECE 208, CE 343,

CE 344, and the following count for 1 credit each: ABE 305, ECE 270, CE 352, CE 353, ME 309, MSE 235, MSE 335, MSE 367, NUCL 205). One credit of hands-on lab (not computer) may be in other disciplines (e.g., science) but courses cannot be included in first year of engineering. Only the credits assigned to lab can be included in this category. 1 cr lab + 2 engr lab

Note: The lecture credits of engineering courses with 1 or 2 credits of lab can be included in engineering electives, and the lecture credit for courses in other disciplines can be included in Area.

c. Engineering course in materials or strength of materials. (Example courses: MSE 230, A&AE 204, NUCL 273, or ME 323) 3

Total credits engineering selectives: 8 engr + 1 cr lab

Engineering area: For each plan of study may include required, selectives and/or electives (may include extra engineering laboratory or design credits). These courses are chosen to meet the student's educational objectives. Engineering course taken as Statistics Selective counts as engineering area course.

Typically 15-20

Minimum Engineering credits @ 200+ level 47

Area: Chosen to satisfy educational objectives. For each plan of study may include required courses, selectives and/or electives. Statistics course taken as Statistics Selective counts as area course. There is no minimum in the Area since more than 47 credits of engineering courses may be taken.

Typically 9-16

Minimum required for graduation 124

Other Graduation Requirements: All plans of study must be approved by the Department of Engineering Education. Unique plans of study developed by students must be approved by ENE with the advice of the IDE Council. Standard, pre-approved plans of study require approval by the student's advisor. An overall Graduation Index of 2.0 or higher and a minimum GPA of 2.0 in the engineering courses at the 200 level and higher included in the plan of study are required. All other Purdue University graduation requirements must be satisfied.

Attachment B.
Proposed Degree Requirements for Bachelor of Science in Engineering (BSE) Degree in Interdisciplinary Engineering (IDE).

First Year Engineering Program: **Credits 29-33**

MA 165 & 166 or 161 & 162 or equivalent.
CHM 115 or equivalent
Phys 172 or equivalent
ENGL 106 or 108 or equivalent
ENGR 100/103/104 and 126 or equivalent
Science Selective
General education or COM 114
If the common first year program in engineering is changed, the BSE requirements will be changed to reflect these changes.

Communications Selective: One of the following: Com 114*, Com 315, Com 320, Com 325 or equivalent. These courses can count towards the first year program, towards the general education program, or towards the Area requirements. (3 – counted elsewhere)

*Com 114 during the first year program is recommended as normal course.

Required sophomore mathematics: Multivariate calculus (MA 261), and linear algebra & differential equations, MA 262 or (MA 265 & 266), or equivalent, 8-10

Sophomore Science selective: One of the following: Phys 241, Phys 272, Biol 121, Biol 230, organic chemistry or equivalent. May be specified in individual plan of study. 3-4

Note: If MA 165 and 166 and 262 are taken, science selectives must add to at least 7 credits, or an area course must be math or science.

Probability or Statistics selective: One of the following: IE 230*, IE 330, ChE 320, STAT 350, STAT 511 or equivalent. The engineering courses count towards the required 47 credits in engineering. The Statistics courses count towards the Area requirements. (3 – counted elsewhere)

* IE 230 is recommended as normal course.

General Education: Follows Engineering's General Education Program requirements. 18

Note: Individual plans of study may recommend particular general education courses.

Engineering: Minimum 47 credits at 200+ levels, of which at least 18 credits are at 300 + levels and at least 6 credits are at 400 + levels. Maximum number of credits in any one engineering discipline is 24. No substitution is allowed for major design experience courses or IDE 301. ***Note: It is the student's responsibility to see that all prerequisites are met.***

Required Engineering Core:

Topic:	**Example Courses:**	**Credits**
Electrical circuits	ECE 201 or equivalent	3
Statics and Dynamics	ME 270, A&AE 203, (CE 297 + 298) or equivalent	3 or 6
Thermodynamics	ME 200, ABE 210, ChE 211 or equivalent	3
Engineering Economics	IE 343 or equivalent	3
Fluid mechanics	ME 309 (1 cr. counts as lab), CE 340, ChE 377 or equivalent	3
Major design experience	EPICS (senior design option) or IDE 485	3
Professional Preparation	IDE 301	1

Typical Engineering Core total credits 19-22

Engineering Selectives: Do parts a, b, and c.

a. Three additional credits of engineering design. Must be approved by Dept. Engineering Education. Example courses: ABE 325, ABE 330, ABE 435, ABE 527, A&AE 251, CE 453, CE 470, IE 486, ME 263, ME 413, or EPICS (300 level or above). [A total of 6 credits of EPICS is required if EPICS is used as both the engineering design selective and the major design experience course.] Should be completed before taking major design experience course(s). 3

b. Three credits of hands-on (not computer) laboratory. At least 2 credits must be in engineering (Example courses: A&AE 204L, A&AE 352L, A&AE 364L, ECE 207, ECE 208, CE 343, CE 344, and the following count for 1 credit of laboratory each: ABE 305, ECE 270, CE 352, CE 353, IE 386, ME 309, MSE 235, MSE 335, MSE 367, NUCL 205). One credit of hands-on lab (not computer) may be in other disciplines (e.g., science) but courses cannot be one of the required courses in the First Year Engineering Program. (Note: Since CHEM 116 is a selective, it satisfies the requirement of one credit of lab, but the credit cannot be double counted.) Only the credits assigned to lab can be included in this category.

1 cr lab (may be counted elsewhere) + 2 engr lab

Note: The lecture credits of engineering courses with 1 or 2 credits of lab can be included in engineering electives, and the lecture credit for courses in other disciplines can be included in Area except for CHEM 116 where all 4 credits are included in the First Year Engineering Program.

c. Engineering course in materials or strength of materials. (Example courses: MSE 230, A&AE 204, NUCL 273, or ME 323) 3

Total credits engineering selectives: 8 engr + 1 cr lab

Engineering area: For each plan of study may include required, selectives and/or electives (may include extra engineering laboratory or design credits). These courses are chosen to meet the student's educational objectives. Engineering course taken as Statistics Selective counts as engineering area course. Typically 15-20

Minimum Engineering credits @ 200+ level 47

Area: Chosen to satisfy educational objectives. For each plan of study may include required courses, selectives and/or electives. Statistics course taken as Statistics Selective counts as area course. There is no minimum in the Area since more than 47 credits of engineering courses may be taken. Typically 9-16

Minimum required for graduation 124

Other Graduation Requirements: All plans of study must be approved by the Department of Engineering Education. Unique plans of study developed by students must be approved by ENE with the advice of the IDE Council. Standard, pre-approved plans of study require approval by the student's advisor. An overall Graduation Index of 2.0 or higher and a minimum GPA of 2.0 in the engineering courses at the 200 level and higher included in the plan of study are required. All other Purdue University graduation requirements must be satisfied.

Attachment C
Example Plan of Study for the Proposed Degree Requirements for Bachelor a Science in Engineering (BSE)

Plan of Study
ABET Accredited, Acoustical Engineering

First year Engineering Program: 29-33
If the common first year program in engineering is changed, the BSE requirements will be changed to reflect these changes.

Required sophomore mathematics: Multivariate calculus (MA 261), and linear algebra & differential equations, MA 262 or (MA 265 & 266), or equivalent 8-10

General Education: Follow Engineering's General Education Program requirements. Strongly suggest MUS 250, MUS 361, MUS 362, & THTR 201 18

Communications Selective: One of the following: Com 114*, Com 315, Com 320, Com 325 or equivalent. These courses can count towards the first year program, towards the general education program, or towards the Area requirements. (3 – counted elsewhere)

*Com 114 during the first year program is recommended as normal course.

Science Selective: Must take Physics 241 or 272 or equivalent 3-4

Note: If MA 165 and 166 and 262 are taken, science selectives must add to at least 7 credits, or an area course must be math or science.

Probability or Statistics Selective: IE 230* or ChE 320 is suggested to leave room in area for THTR courses. The engineering courses count towards the required 47 credits in engineering. If used, STAT 350 or 511 count towards the Area requirements. (3 – counted elsewhere)

* IE 230 is recommended as normal course.

Engineering: Minimum 47 credits, of which at least 18 credits are at 300 + level and at least 6 credits are at 400 + levels. Maximum number of credits in any one engineering discipline is 24. No substitution is allowed for major design experience courses or IDE 301. ***Note It is the student's responsibility to see that all prerequisites are met.***

Required Engineering Core:

Electrical circuits	ECE 201 or equivalent	3
Statics and Dynamics	ME 270, A&AE 203, (CE 297 + 298) or equivalent	3 or 6
Thermodynamics	ME 200, ABE 210, ChE 211 or equivalent	3
Engineering Economics	IE 343 or equivalent	3
Fluid mechanics	ME 309 (1 cr. counts as lab), CE 340, ChE 377 or equivalent	3
Major design experience	EPICS (senior design option) or IDE 485	3
Professional Preparation	IDE 301	1
	Typical Engineering Core total credits	19-22

Engineering Selectives:

a. Three additional credits of engineering design. In this POS this requirement is met with ME 413. Should be completed before IDE 485 or EPICS. (3 – counted elsewhere)

b. Three credits of hands-on (not computer) laboratory. At least 2 credits must be in engineering (Example courses: A&AE 204L, A&AE 352L, A&AE 364L, ECE 207, ECE 208, CE 343,

CE 344, and the following count for 1 credit of laboratory each: ABE 305, ECE 270, CE 352, CE 353, IE 386, ME 309, MSE 235, MSE 335, MSE 367, NUCL 205). One credit of hands-on lab (not computer) may be in other disciplines (e.g., science) but courses cannot be one of the required courses in the First-Year Engineering Program. (Note: Since CHEM 116 is a selective, it satisfies the requirement of one credit of lab, but the credit cannot be double counted.) Only the credits assigned to lab can be included in this category.

1 cr lab (may be counted elsewhere) + 2 engr lab

Note: The lecture credits of engineering courses with 1 or 2 credits of lab can be included in engineering electives, and the lecture credit for courses in other disciplines can be included in Area except for CHEM 116 where all 4 credits are included in the First Year Engineering Program.

c. Engineering course in materials or strength of materials. (Example courses: MSE 230, A&AE 204, NUCL 273, or ME 323) 3

Total credits engineering selectives: 5 engr + 1 cr lab

Engineering area: ***Required courses:***

ME 413 Noise Control (counts as design selective, but cannot double count) 3
ME 513 Engineering Acoustics 3
If these courses are not offered substitutions approved by ENE will be allowed.

Engineering area: ***Suggested Electives***: CE 350, EE202, EE 255, EE 270, EE 301, ME 365, ME 375, ME 597A (Practical Experience in Vibrations), either MSE 230 or NUCL 273 not taken as selective, additional design courses, and undergraduate research. Engineering course taken as Statistics Selective counts as engineering area course, but is not double-counted for graduation.

13-14

Total Engineering Area Courses 19-20
Total required Engineering credits @ 200+ level 47

Area:

Area Selectives: A minimum of seven THTR credits are required. Do as many of the following as you can schedule: THTR 163, 263, 353, 363, 553, and 563. Minimum7-9

Note: Since scheduling is often difficult, substitutions will be allowed with permission of both IDE and the Theater Department.

Area Electives: Consider earning a minor in Theatre Design and Technology, which requires THTR 368 in the area (and THTR 201 as a general education elective). Also consider ENGL 421, COM 325, MA 303 (if take MA 262), MGMT 200, MGMT 201, OBHR 300, ENTR 200, additional engineering courses, and other courses to meet educational objectives. 0-9

Typical total in Area 11-18

Minimum required for graduation 124

Other Graduation Requirements: This standard, pre-approved plan of study requires approval by the student's advisor. An overall Graduation Index of 2.0 or higher and a minimum GPA of 2.0 in the engineering courses at the 200 level and higher included in the plan of study are required. All other Purdue University graduation requirements must be satisfied.

Supporting Documentation

Engineering Faculty Document 16-04
Revised March 2, 2005

To: The Engineering Faculty
From: The Department of Engineering Education
Date: February 16, 2005
Subject: Changes in Graduation Requirements for IDE BSE Degree

After including the suggestions of the IDE Advisory Council, the Department of Engineering Education (ENE) approved the following new degree requirements for the Bachelor of Science in Engineering (BSE) in Interdisciplinary Engineering. The document has been revised following the suggestions of CFR. This action is now submitted to the Engineering Faculty with a recommendation for approval.

BACKGROUND: Based on EFD 20-69, 20-72 and 107-00 the Division of Interdisciplinary Engineering Studies had authority to offer a BSE degree. This authority transfers to ENE which now has administrative responsibility for the IDE program. The BSE degree currently requires 124 credits to graduate including the same first year courses as the College of Engineering (32-33 credits) and the same general education package as the College of Engineering (18 credits). A minimum of 44 credits in Mathematics, Basic Sciences and Engineering (MBSE) is required. The MBSE courses must include Physics 241 or 261, MA 261 and either MA 262 or (MA 265 & 266), and at least 30 credits of engineering courses (200 level and above), at least 15 credits of which must be at the 300 level or higher. The remaining credits are selected from an area of concentration that is appropriate for the students' plans of study. This degree required approval of the students' plans of study by the IDE Council, which acted as a faculty for the Division. In order to maintain maximum flexibility the BSE degree was not ABET accredited.

IDE graduates a significant number of students who plan on practicing engineering. Some of these graduates have had difficulty becoming licensed as professional engineers. An IDE degree that meets ABET accreditation standards would be appropriate for these students.

SUMMARY OF PROPOSED CHANGES: The Department of Engineering Education is proposing that the BSE degree in Interdisciplinary Engineering meet ABET accreditation standards (minimum of 47 credits of engineering courses for the degree requiring 124 credits) with the requirement that the student must have courses in a number of fundamental areas of engineering. Beyond these requirements, the degree maintains maximum flexibility. The degree would prepare students for the Fundamentals of Engineering examination. The only new courses required to offer a BSE degree that meets ABET accreditation standards are a one credit professional seminar (IDE 300) and a three credit capstone design course (IDE 485).

DETAILED DEGREE REQUIREMENTS: See attached.

Supporting Documentation

Engineering Faculty Document 16-04
Revised March 2, 2005

SAMPLE PLANS OF STUDY: See attached.

CURRENT REQUIREMENTS: See attached.

EFFECTIVE DATE: These rules will be effective for students entering Purdue University in May 2005 and later.

REASON: Since the Division of Interdisciplinary Engineering Studies and the Department of Freshman Engineering merged to form the Department of Engineering Education (ENE), the IDE program (administered by ENE) now has a faculty that, in conjunction with other faculty, allow IDE to offer a program that will meet ABET accreditation standards. Students who want to become practicing engineers will be much better served by earning a degree that meets ABET requirements. The changes in requirements for the BSE degree would much more closely align these requirements with the requirements for bachelor's degrees from the College of Engineering. ENE would plan on seeking ABET accreditation of the IDE program as a General Engineering program in 2007. Students recruited for the Fall 2004 entering class were informed these changes were highly likely.

IDE is designed for students whose educational goals do not fit into any of the Schools of Engineering. Students who can meet their educational objectives in one of these programs are strongly encouraged to do so. IDE currently has requirements in place to prevent students from trying to earn an IDE degree that is in the same area as one of the degrees from the professional schools. These requirements include that students are allowed to take a maximum of 24 credits from any School of Engineering, and plans of study must be impossible to do elsewhere in the College of Engineering. These requirements will be retained with the revised BSE degree.

Current IDE enrollment is approximately 65 students, and has fluctuated naturally in the range from 50 to 100 students. The most popular programs, related to Biomedical Engineering, are being phased out because of the opening of BME to sophomores in fall 2004. Start up of a BSE program that meets ABET accreditation standards would tend to balance this enrollment drop since the program will be attractive to students who want to become professional engineers. The net effect on IDE enrollment will probably be stabilization within the historic range of 50-100. The new BSE program will help IDE meet its mission of helping to retain qualified students in engineering.

How will these changes in IDE affect the resource requirements in the College of Engineering? Our best guess is that about ½ of the students in IDE would choose the BSE program. These students will take, on average, more engineering courses than students in the BS plan. Note that the most rigorous current plans (e.g., in Acoustical Engineering) are very close to the proposed BSE plan. Another factor is that in fulfilling its mission to help retain students in engineering, IDE graduates a significant number of students who enter IDE through the CODO process; typically, every year 1/3 to ½ of the

Supporting Documentation

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Revised March 2, 2005

IDE graduates are CODOs. These students have taken many of their lower division engineering courses before entering IDE. Since most of the required topics in the BSE plan have multiple options, we expect most engineering courses will see almost no change in the number of IDE students enrolled. The two possible exceptions, ECE 201 and IE 230, will probably see increases of less than ten students/year from the current steady state to a new steady state (in ~ 5 years).

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Head
Department of Engineering Education

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE COMMITTEE ON
FACULTY RELATIONS

CFR Minutes 19

Date 4/12/07

Chairman CFR Michael J. Troxel