

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.

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 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).

Kamyar Haghghi
Head
Department of Engineering Education

Proposed New Degree Requirements for Bachelor of Science in Engineering (BSE) degree in Interdisciplinary Engineering.

First Year Engineering Program	Credits 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 300 (no substitution allowed)	1
Professional Seminar	IDE 400	<u>0</u>
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

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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)

Total credits engineering selectives: 3
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.

SAMPLE SCHEDULE FOR BSE PROGRAM

First Year

Same as current First Year Engineering Program. Total 31 or more

Sophomore Year

Fall

MA 261 Multivariable calculus 4
ME 270 3
IE 230 3
General ed 3
Science selective 3
IDE 200 0
Total 16

Spring

MA 262 4
ME 200 3
ECE 201 3 & ECE 207 1
General ed 3
Area 3
Total 17

Junior Year

Fall

IE 343 3
NUCL 273 or MSE 230 3
General Ed 3
Area 3
Engr area 3
Total 15

Spring

ME 309 4
Engr design 3
General Ed 3
Engr. Area 3
Engr lab + lecture 2
IDE 300 1
Total 16

Senior Year

Fall

EPICS 2
Engineering area 3
Area or engineering area 3
General Ed 3
Area 4
IDE 400 0
Total 15

Spring

EPICS 2
Engineering area 3
Engineering area 3
General Ed 3
Area 4
Total 15

Minimum total for graduation: 124 credits (students may take more)
Engineering, 200 level and above: 47 credits (or more)
Minimum math and basic science: 31 credits

Example for BSE Degree
Sample Plan of Study, ABET Accredited, Acoustical Engineering
Will be a Standard Plan of Study

	Credits
First year Engineering Program	32-33
Sophomore math: MA 261 & 262 (or 261, 265 & 266)	8-10
General Education: Strongly suggest MUS 250, Mus 361, Mus 362.	18
Science Selective: Must take Physics 241 or 261 or equivalent	3-4
Statistics Selective: *IE 230, IE 330 or ChE 320 are 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)	

Engineering: Minimum 47 credits, of which at least 18 credits are at 300 + level. Maximum number of credits in any one engineering discipline is 24. Students are responsible for meeting the prerequisite requirements of courses.

Required Engineering Core: (Can substitute equivalent courses except for IDE courses.)

ECE201	3
ME 270 and ME 274 or CE 297 and 298	6
ME 200, ABE 210, or ChE 211	3
IE 343	3
ME 309(1 cr ME 309 counts as lab), CE 340, ChE 377	3
EPICS (senior design option, 2 + 2) or IDE 485	4 or 3
IDE 300 Professional Preparation	1
Engineering Core total credits	22-23

Engineering Selectives:

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 (for students who CODO from ME only) or EPICS (if take IDE 485 for capstone design). Must be completed before taking capstone design course. 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

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

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.

Engineering area: Required courses:

ME 413 Noise Control 3

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Suggested Electives: CE 350, ECE202, ECE 255, ECE 270, ECE 301, ME 365, ME 375, ME 513 (Engineering Acoustics), ME 563, ME 597A (Practical Experience in Vibrations), either MSE 230 or NUCL 273 not taken as selective, and extra design courses. Students are responsible for meeting the prerequisite requirements of courses. Engineering course taken as Statistics Selective counts as engineering area course, but is not double-counted for graduation.

	12-13
Total Engineering Area Courses	<u>15-16</u>
Total required Engineering credits @ 200+ level	47

Area: Required course in area:

THTR 263 3

Area Selectives: Six additional THTR credits are required. Do either (THTR 363 and THTR 563) or (THTR 353 and THTR 553) 3+3

Required plus selective courses in area 9

Area Electives: Take as many sound & audio courses from the Theater Dept. as possible. Also consider ENGL 421. 0-7

Typical total in area	9-16
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.

Current Requirements for BSE Degree in IDE

	Credits
Freshman 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	

General Education: Follow Engineering's General Education Program requirements. **18**

Math, Basic Science and Engineering (MBSE):

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

Required sophomore physics: Phys 241, Phys 261, or equivalent 3-4

Engineering: Minimum at 200+ levels 30

At least 15 credits of engineering courses must be at 300 + levels. Maximum number of credits in any one engineering discipline is 24.

Additional mathematics or science courses as needed.		<u>0-3</u>
	Minimum MBSE	44

Area: Additional courses selected to satisfy the student's educational objectives. There is no minimum in the Area since more than 44 credits of MBSE courses may be taken.

Maximum **30**

Minimum credits required for graduation **124**

Other Graduation Requirements: All plans of study must be approved by the IDE Council. 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.