

On Nov 30, 2010, at 8:11 PM, Breitenberger, Caroline wrote:

Dear Professor Lilly,

I am a member of Subcommittee B of the Council on Academic Affairs, which is currently reviewing your department's proposal for revision and semester conversion of the BS in Industrial and Systems Engineering. You are listed as the primary contact for questions regarding this proposal. We have a number of questions about your proposal; if you could provide the answers or direct me to someone who can, this would greatly speed the approval process for the BSISE. I apologize for being very long-winded below – there are really three major issues, followed by a list of additional points requiring clarification.

The three major issues that we felt needed to be addressed:

1. On your page A: 2 (#7), you refer to a Curriculum Map. I did not find an actual "Curriculum Map" in the indicated attachments. A template for the information required in a curriculum map is given in the Quarter to Semester Conversion Template document. The curriculum map should include a matrix of courses mapped to your program outcomes, with the level at which each course meets program outcomes indicated as beginning, intermediate, or advanced. Ed McCaul has experience with these, and should be able to show you how other programs in Engineering have provided the information required.
2. Given the number of course changes in the proposed major, we thought it would help to have a table listing the current and proposed course requirements (with course titles and credit hours) in side by side columns, indicating which courses are being directly converted from Q2S, which ones have expanded content, and which have reduced content, and also showing courses that are new in the proposed major, or have been eliminated from it. A comments column could help clarify why certain courses have been added or eliminated. In other words, if you could take your BSISE Semester Curriculum and the current BSISE quarter curriculum and put them in one table, aligning the equivalent courses, and including comments, it would help us understand how the program is changing.
3. There were a number of questions about your transition plans.
 - a. On your page A: 4, you indicate that all ISE majors who started at OSU prior to Au11 will be allowed to choose between the proposed curriculum or the current program. That suggests to me that a student planning to graduate in Wi12 or Sp12 could choose to graduate under the proposed major – is this possible if the semester-based courses are not yet offered? The text on A: 4 is confusing, and it probably needs to be more clear as to when the new major becomes an option, and for which student cohorts.
 - b. You are to be commended for facilitating student advising with the separate transition plans for different cohorts of students interested in the current and revised majors (attachment #6). However, I don't see a transition plan for Au11 NFQF, just Au09 and Au10. Since the Au11 students will have one year of quarter-based courses, there should be a stated plan for the courses they will take, even if they may not face any serious transition issues. Also, is there any

possibility that Au08 NFQF or earlier cohorts might need a separate transition plan? Is there any possibility that students might transfer into the major and need a separate transition plan?

The following questions are areas which require additional clarification:

4. Dr. Hagle's cover memo for the proposal states that the BSISE revision was approved without dissent, and that the entire proposal (including graduate and undergraduate programs) was approved by faculty vote. Is it correct to assume that a separate vote was taken on the BS alone (since there was one dissenter on the entire proposal)? Could you please clarify what "defer to the judgment of their colleagues" means in the vote on the entire proposal?
5. On your page A: 3, the third bullet, you state, "the combination of Technical Electives taken will be subject to approval of the Undergraduate Studies Committee..." This sounds like the USC will vet each individual student's Technical Elective choices – is that really what you mean? If not, please clarify.
6. On your page A: 4, the rationale under #12 is difficult to follow. This section might become much easier to understand if a good curricular comparison table is provided (as indicated under #2 above).
7. Some typos in the "Transition Policy" on page A: 4. Second sentence: "Graduation requirements..." Line 9: "...advised in a manner that will facilitate planning..." Line 11: "... being educated about boththe current..."
8. Attachment #2 is a four-year sample curriculum for the semester-based BSISE, not a curriculum map or "Bingo" advising sheet, as suggested by the attachment title. All three (the 4-year curriculum, the curriculum map as described under #1, and the "Bingo" sheet for advising purposes) would be useful.
9. Attachment #4 has the Current Requirements, but not the Advising Sheet as indicated in the title.
10. Attachment #5 is called the "Proposed Advising Sheet," but I am not sure how helpful this will be for advising purposes. I had to puzzle over it for a while to figure out what it meant. It needs some explanatory text, or it should be recast as a "Bingo" sheet as in other engineering programs. Since the same courses are taken in the same order, I am not sure why the semesters are indicated for the two different major declaration time points – could you eliminate the second table at the bottom, and just indicate Term 1, 2, 3, 4 instead of Au-Sp-Au-Sp?

Please do not hesitate to contact me by email or by phone (2-6945) if I haven't clearly articulated my questions in the points above.

I do appreciate what a tremendous amount of effort and thought you have put into this proposal!

Regards,

Caroline

Caroline A. Breitenberger, Ph.D.

Director, Center for Life Sciences Education

Ohio State University

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1735 Neil Ave.

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292-6945 (telephone)

292-4390 (fax)

From: Blaine Lilly [mailto:lilly.2@osu.edu]
Sent: Wednesday, December 01, 2010 8:14 AM
To: Breitenberger, Caroline
Cc: Marilyn Blackwell; Julie Higle; David Tomasko
Subject: Re: BS in ISE questions

Dear Professor Breitenberger,

Thanks for your very detailed email. Given that we're just now heading into finals week, it may be a week or two before we can answer your specific requests in detail. However, you can expect to have a full reply by the 15th of this month.

I should probably note that the reason our proposal does not follow the OSU Semester Conversion Template is that the template did not exist last year, when we were putting together our semester plans. Since the College of Engineering volunteered to go through the conversion process before the rest of the university, we were forced to create our own templates, which we felt conveyed the essentials. Apparently we still have a lot of work to do.

Best regards,

Blaine Lilly

From: Blaine Lilly [mailto:lilly.2@osu.edu]
Sent: Friday, January 14, 2011 10:41 AM
To: blackwell.4@osu.edu
Cc: Breitenberger, Caroline
Subject: ISE Semester Program docs

Hello Professor Blackwell,

Agi told me last night that you're concerned that your committee hasn't heard from us in over a month. My apologies for not getting back to you sooner. What actually happened is that your request for more information came back to us the same day we were going through our Academic Program Review. I discussed your concerns with Julie Higle, the chair of ISE, but at the time she was busy with the program review, and then she left on travel for an extended period. In the meanwhile, I prepared the curriculum map that we somehow left out of our original document, and corrected some of the flaws in the document.

I met yesterday afternoon with Julie, and we hope to get this wrapped up by next week. I'll be emailing Professor Breitenberger today to try to set up a time to meet with her next week, to be sure that we're answering the questions to your satisfaction. We're all looking forward to the day when this is done, and behind us.

Best regards,

Blaine

-----Original Message-----

From: Blaine Lilly [mailto:lilly.2@osu.edu]
Sent: Saturday, January 29, 2011 3:39 PM
To: Breitenberger, Caroline
Subject: Question regarding bingo sheet

Hello Caroline,

I've been working away on the changes you requested on the ISE program docs, but one question in particular baffles me. It involves what exactly you expect from a "bingo" sheet. I'm attaching a version of what we call our bingo sheet - this one is for the semester program. If you wouldn't mind, could you give it a quick look and tell me whether it's satisfactory or not, and if not, exactly what you expect to see that's lacking?

That would be a great help to me. I hope to have this all wrapped up within the next day or two.

Thanks very much,

Blaine



[ISE BIngo.docx](#)



[ATT000011.txt](#)

From: Blaine Lilly [mailto:lilly.2@osu.edu]
Sent: Sunday, February 06, 2011 2:54 PM
To: Breitenberger, Caroline
Cc: Julie Hagle; Ed McCaul; Jerry Brevick
Subject: Revised ISE BS program document

Dear Caroline,

At long last, here is our revised Q2S document for the BS program in Industrial and Systems Engineering. Attached please find: a short document with your questions, and our responses and the revised program document in pdf format.

Thanks very much for your constructive criticisms and also your patience. I hope this document will resolve any outstanding questions. If not, I would be happy to address them.

Best regards,

Blaine



[ISE Response to CAA Questions.docx](#)



[ATT000011.htm](#)



[BS ISE Program 2-6-11.pdf](#)



[ATT00002.htm](#)

Undergraduate Program in Industrial and Systems Engineering
The Ohio State University
NFQF Autumn 2012

COURSES WHICH MUST BE COMPLETED BEFORE APPLYING TO THE MAJOR:

Student must have at least a cumulative 2.0 GPA and at least a 2.0 cumulative in these courses or their equivalents:

Engineering 1181 (2)
Engineering 1182 (2)
CSE 1222 (3)
MATH 1151 (5)
MATH 1152 (5)
PHYSICS 1250 (5)

ADDITIONAL PREREQUISITES WHICH MUST BE COMPLETED BEFORE BEGINNING ISE MAJOR CORE COURSES:

ENG 1100 (1)
ENGLISH 1100 (3)
MATH 2173 (3)
MATH 2174 (3)
STAT 3470 (3)
Additional Science: Choose 7 CH from:
PHYSICS 1251
CHEMISTRY
BIOLOGY

ENG Science (3)
ME 2040 (4)
ISE 2000 (1.5)
ISE 2010 (3)
ISE 2040 (2)
ISE 2400 (1.5)
ISE 2500 (3)

Sequence of courses for students who begin ISE core in Autumn Semester

AU	SP	AU	SP
ISE 3200 (3)	ISE 3210 (3)	ISE 3800, 3810 (2, 1)	ISE 4900 (4)
ISE 3300 (3)	ISE 3410 (3)	ISE 5310 (3)	Tech Elec (3)
ISE 3400 (3)	ISE 3700 (3)	Tech Elec (3)	Tech Elec (3)
ISE 3600 (3)	ISE 4120 (3)	Tech Elec (3)	Gen Ed (3)

Sequence of courses for students who begin ISE core in Spring Semester

SP	AU	SP	AU
ISE 3200 (3)	ISE 3210 (3)	ISE 3800, 3810 (2, 1)	ISE 4900 (4)
ISE 3300 (3)	ISE 3410 (3)	ISE 5310 (3)	Tech Elec (3)
ISE 3400 (3)	ISE 3700 (3)	Tech Elec (3)	Tech Elec (3)
ISE 3600 (3)	ISE 4120 (3)	Tech Elec (3)	Gen Ed (3)

An additional 21 credit hours of general education courses are required for graduation.

Marilyn:

I have looked over this packet, and I believe all of our questions have been thoughtfully addressed. I propose that we add this to our subcommittee agenda on Tuesday. I can present the proposal and the revisions that were made.

Just a heads-up: if we decide to bring this proposal to CAA on Wednesday, I won't be able to be there. I have back-to-back meetings and office hours.

Caroline

This document consists of the set of questions and concerns raised in the email of 30 November 2010, followed by our responses, in italics, to each concern:

The three major issues that we felt needed to be addressed:

1. On your page A: 2 (#7), you refer to a Curriculum Map. I did not find an actual “Curriculum Map” in the indicated attachments. A template for the information required in a curriculum map is given in the Quarter to Semester Conversion Template document. The curriculum map should include a matrix of courses mapped to your program outcomes, with the level at which each course meets program outcomes indicated as beginning, intermediate, or advanced. Ed McCaul has experience with these, and should be able to show you how other programs in Engineering have provided the information required.

Our apologies for inadvertently leaving the curriculum map out of our original proposal. The map is now included in Attachment #2, along with the comparison chart you requested in (2) below.

2. Given the number of course changes in the proposed major, we thought it would help to have a table listing the current and proposed course requirements (with course titles and credit hours) in side by side columns, indicating which courses are being directly converted from Q2S, which ones have expanded content, and which have reduced content, and also showing courses that are new in the proposed major, or have been eliminated from it. A comments column could help clarify why certain courses have been added or eliminated. In other words, if you could take your BSISE Semester Curriculum and the current BSISE quarter curriculum and put them in one table, aligning the equivalent courses, and including comments, it would help us understand how the program is changing.

The table is also included in Attachment #2.

3. There were a number of questions about your transition plans.
 - a. On your page A: 4, you indicate that all ISE majors who started at OSU prior to Au11 will be allowed to choose between the proposed curriculum or the current program. That suggests to me that a

student planning to graduate in Wi12 or Sp12 could choose to graduate under the proposed major – is this possible if the semester-based courses are not yet offered? The text on A: 4 is confusing, and it probably needs to be more clear as to when the new major becomes an option, and for which student cohorts.

*Yes, it will be possible for students who are enrolled in the major and planning to graduate in Winter or Spring of 2012 will be able to graduate under the semester plan. This is because, unlike many other departments in engineering, we will offer transition courses to our students **before** the change to semesters. By taking this path, our students will in fact have the required coursework for the semester program completed at the time they graduate. The transition courses will be structured to ensure that they have the necessary content. The first transition course will be offered in Spring, 2011, and throughout AY 2011–2012. In addition, I have added a clarifying sentence in the paragraph you refer to on page A-4.*

- b. You are to be commended for facilitating student advising with the separate transition plans for different cohorts of students interested in the current and revised majors (attachment #6). However, I don't see a transition plan for Au11 NFQF, just Au09 and Au10. Since the Au11 students will have one year of quarter-based courses, there should be a stated plan for the courses they will take, even if they may not face any serious transition issues. Also, is there any possibility that Au08 NFQF or earlier cohorts might need a separate transition plan? Is there any possibility that students might transfer into the major and need a separate transition plan?

We did not originally include the Au11 NFQF students in our transition plan, because they will not officially enter our department until after the transition to semesters has occurred. Because the core curriculum for the College of Engineering will be much smaller (and less restrictive) under semesters, we do not anticipate that students who follow the standard quarter curriculum for first year students will encounter any problems entering our curriculum. In any event, a transition plan for Au 11 NFQF is included at the end of Attachment #6.

At the time of this writing, we are still waiting for Physics to propose a transition course for students who complete only Physics 131, but not 132. We do assume that first year students who have not completed Physics 132 will need to enroll in this

transition course. However, we don't anticipate any problem with the math requirement.

Regarding transfer students, they will be placed into the cohort that best fits their academic record at the time of transfer, and will proceed accordingly.

The following questions are areas which require additional clarification:

4. Dr. Higle's cover memo for the proposal states that the BSISE revision was approved without dissent, and that the entire proposal (including graduate and undergraduate programs) was approved by faculty vote. Is it correct to assume that a separate vote was taken on the BS alone (since there was one dissenter on the entire proposal)?

Yes, there was a separate vote on the BS proposal.

Could you please clarify what "defer to the judgment of their colleagues" means in the vote on the entire proposal?

This comment was meant to say that one member of the faculty abstained from voting. (My recollection is that this was a colleague who was retiring shortly after the vote, and did not feel that it was appropriate for him to vote.)

5. On your page A: 3, the third bullet, you state, "the combination of Technical Electives taken will be subject to approval of the Undergraduate Studies Committee..." This sounds like the USC will vet each individual student's Technical Elective choices – is that really what you mean? If not, please clarify.

Yes, this is exactly what we mean. Each of our students will be individually advised, and we will sign a "contract" with each student guaranteeing them that their progress to graduation will not be delayed if they stay on the agreed program. The only exception will be students who were planning to graduate during Winter Quarter, 2013, who will be unavoidably delayed until Spring.

6. On your page A: 4, the rationale under #12 is difficult to follow. This section might become much easier to understand if a good curricular comparison table is provided (as indicated under #2 above).

Done. Please see attachment #2.

7. Some typos in the “Transition Policy” on page A: 4. Second sentence: “Graduation requirements...” Line 9: “...advised in a manner that will facilitate planning...” Line 11: “... being educated about both the current...”

Thank you. These typos have been corrected.

8. Attachment #2 is a four-year sample curriculum for the semester-based BSISE, not a curriculum map or “Bingo” advising sheet, as suggested by the attachment title. All three (the 4-year curriculum, the curriculum map as described under #1, and the “Bingo” sheet for advising purposes) would be useful.

I believe these problems have been addressed with the changes made to Attachment #2.

9. Attachment #4 has the Current Requirements, but not the Advising Sheet as indicated in the title.

This problem has also been corrected.

10. Attachment #5 is called the “Proposed Advising Sheet,” but I am not sure how helpful this will be for advising purposes. I had to puzzle over it for a while to figure out what it meant. It needs some explanatory text, or it should be recast as a “Bingo” sheet as in other engineering programs. Since the same courses are taken in the same order, I am not sure why the semesters are indicated for the two different major declaration time points – could you eliminate the second table at the bottom, and just indicate Term 1, 2, 3, 4 instead of Au-Sp-Au-Sp?

The sheet included is quite similar to the advising sheets we have used in the ISE department for many years. It is not our intent that the students will advise themselves, but rather that they will have individual conversations with our departmental advising staff to determine what courses they need to finish in order to graduate. We do a great deal of one-on-one advising of our students, so this is not a departure from our standard practice, at all.



College of Engineering

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Phone 614-292-2651
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E-mail engosu@osu.edu

Date: 12 August 2010

To: Randy Smith
Vice Provost, Office of Academic Affairs

From: Ed McCaul 
Secretary College of Engineering Committee on Academy Affairs (CCAA)

Subject: Semester Conversion Proposals for BS in Industrial and Systems Engineering, BS/MS in Industrial and Systems Engineering, withdrawal of the Industrial and Systems Engineering Advanced Professional Degree, and withdrawal of the Graduate Interdisciplinary Specialization in Manufacturing Science

Attached is a letter from Julia Higle, Department Chair of Integrated Systems Engineering, which discusses their BS/MS in Industrial and Systems Engineering program, withdrawal of their Industrial and Systems Engineering Advanced Professional Degree, and withdrawal of their Graduate Interdisciplinary Specialization in Manufacturing Science. Also attached is a semester conversion proposal for their BS in Industrial and Systems Engineering Degree.

These proposals were reviewed by a subcommittee of CCAA. After reviewing the proposals and having some changes made to the BS in Industrial and Systems Engineering Degree proposal the subcommittee recommended to the full committee that these four proposals be approved. After a discussion, CCAA unanimously approved the proposal on the 11th of August 2010 and requested that I forward the proposal to you for consideration by CAA. If you have any questions concerning this proposal please let me know.




Department of Integrated Systems Engineering

210 Baker Systems Building
1971 Neil Avenue
Columbus, OH 43210-1217

Phone (614) 292-6239

Fax (614) 292-7852

To: Office of Academic Affairs
From: Julia L. Higle, ISE Department Chair 
Date: June 8, 2010
Re: Dept. of Integrated Systems Engineering Semester Transition Plans.

The faculty of Integrated Systems Engineering has worked diligently, thoughtfully, and often times, tirelessly, for over a year to review and revise our curricula in preparation for OSU's transition to a semester-based academic calendar. Attached, you will find our proposal for the degree requirements for the degree programs in Industrial and Systems Engineering (i.e., BS, MS, and PhD) and our plan for transition to implementation. In agreement with the decision of the faculty, I heartily recommend its approval.

The ISE Department currently administers the following programs:

- PhD in Industrial and Systems Engineering. As indicated in the attached proposal, except for the translation of courses from quarters to semesters, the structure and requirements of this program are not undergoing revision driven by the transition to semesters.
- MS in Industrial and Systems Engineering. As indicated in the attached proposal, except for the translation of courses from quarters to semesters, the structure and requirements of this program are not undergoing revision driven by the transition to semesters.
- Advanced Professional Degree Program which leads to the post baccalaureate degree Industrial Engineer. We find neither a record nor a memory of students pursuing this program for an extended number of years. A recommendation to withdraw this program was approved by the faculty, without dissent. Consequently, we are withdrawing this Advanced Professional Degree Program, in accordance with the decision of the faculty.
- MBLE, the Master of Business Logistics Engineering. This program is offered in collaboration with the Fisher College of Business. Any revisions to the MBLE program will be undertaken in collaboration with our colleagues in the COB and will be submitted in accordance with the transition planning schedule determined by COB. Consequently, there are no revisions to this program included with this plan.
- Graduate Interdisciplinary Specialization in Manufacturing Science. Demand for this program has waned considerably over the past decade. On advice of the ISE Manufacturing Faculty, the ISMS is not being defined for the semester transition. In its place, we anticipate offering a minor in Manufacturing Processes. Once the requirements for undergraduate minors have been defined, we this program will be configured and submitted for approval.
- Graduate Interdisciplinary Specialization in Engineering Management. This program is offered in collaboration with the Fisher College of Business. Any revisions to the ISEM will be undertaken in collaboration with our colleagues in the COB and will be submitted in accordance with the transition planning schedule determined by COB. Consequently, there are no revisions to this program included with this plan.

- BS in Industrial and Systems Engineering. This program is undergoing a revision, per the attached proposal. The curriculum revision described within the proposal was approved by the faculty, without dissent.
- The department offers a BS/MS option, and will continue to do so. This program will adhere to the requirements as described in the College of Engineering document.

In arriving at the proposed curriculum, the faculty has been actively represented on the College of Engineering Quarter-to-Semester Task Force. We have similarly participated in the revision of the definition of the College of Engineering BS core requirements. Faculty members have been involved in all phases of the curriculum revision, through several iterations and in countless meetings. They have similarly been involved in the development and revision of our collection of course offerings that support our programs. We have solicited, and incorporated, input from current students through group meetings and in one-on-one advising sessions. We have solicited, and incorporated, input from our Alumni Advisory Board at both the start and the end of our deliberations. The response from our current students and our advisory board has been extremely positive.

This proposal has been submitted in its entirety to the faculty for review. The vote of the faculty is as follows:

- 15 approve
- 1 does not approve
- 3 defer to the judgement of their colleagues

We look forward to a favorable response from OAA, leading to implementation of our new curriculum and transition plan.

Curriculum revision and transition proposal for:

A: BS, ISE

B: MS, ISE

C: PhD, ISE

Submitted by the Department of Integrated Systems Engineering

J.L. Higle, Professor and Chair
higle.1, 292-8100

A: Industrial and Systems Engineering (ISE) Program Proposal

Primary Contact: Blaine W. Lilly (lilly.2, 292-2297)

1. Name of Program

Industrial and Systems Engineering

2. Name of Degree:

Bachelor of Science in Industrial and Systems Engineering (BSISE)

3. Responsible Academic Unit:

Department of Integrated Systems Engineering

4. Type of program:

Undergraduate bachelors degree program

5. Semester Conversion Designation:

a) Re-envisioned with significant changes to curricular requirements (core requirements, tracks/options/courses), but no changes to program goals.

6. Program Learning Goals

Because of a requirement to use the terminology of the ISE programs accrediting body (ABET, Inc), program goals are separated into “objectives” and “outcomes”. ABET terminology defines these terms as follows:

- Program Educational Objectives: broad statements that describe the career and professional accomplishments that the program is preparing the graduates to achieve.
- Program Outcomes: narrower statements that describe what students are expected to know and be able to do by the time of graduation (related to skills, knowledge, and behaviors that students acquire in their matriculation through the program).

PROGRAM EDUCATIONAL OBJECTIVES (What our graduates will be doing two to three years after graduation)

1. Graduates are engaged in integrating systems of people, machines, materials, information, energy, and financial resources.
2. Graduates employ science and engineering based methods to solve real problems. Graduates continue to expand and enhance their professional skills.
3. ISE graduates effectively communicate opportunities and solutions to technical and non-technical communities.
4. Graduates work effectively and ethically as leaders and members of teams, and as individuals.

PROGRAM OUTCOMES (What we expect of our graduates at the time of graduation)

- (a) An ability to apply knowledge of mathematics, science, and engineering.
- (b) An ability to design and conduct experiments, as well as to analyze and interpret data.
- (c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- (d) An ability to function on multidisciplinary teams.
- (e) An ability to identify, formulate, and solve engineering problems.
- (f) An understanding of professional and ethical responsibility.
- (g) An ability to communicate effectively.
- (h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- (i) A recognition of the need for, and an ability to engage in life-long learning.

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- (j) Knowledge of contemporary issues.
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

7. Proposed Program Requirements

Throughout this document and its attachments, CH="credit hours", QCH = "credit hours taken on a quarter calendar" and SCH = "credit hours taken on a semester calendar".

See Attachment #1: BSISE Proposed Program Requirements, and Attachment #2: BSISE Proposed Program (Curriculum Map). The following notes apply:

- General Education requirements will be consistent with designations made by the College of Engineering once other departments' offerings and General Education approved courses are known. For the purposes of this proposal, our curriculum reflects these requirements generically. Our proposed program assumes that the current practice of permitting certain general education requirements such as mathematics, data analysis, and science to be "double counted" in the Engineering Core or the ISE Core will continue as we move to the semester calendar.
- Science elective courses may be any physical or biological science course chosen from a set to be designated by the ISE Undergraduate Studies Committee once science course offerings are known.
- The Engineering Science elective course(s) may be chosen from a set to be designated by the ISE Undergraduate Studies Committee once engineering science course offerings are known.
- Technical electives will be chosen in consultation with an academic advisor, and are subject to approval by the ISE Undergraduate Studies Committee. At least 6 of the 12 required technical elective credit hours must be ISE courses. Up to 6 of the 12 required technical elective credit hours may be double counted from one set of "related minors" to be designated by the ISE Undergraduate Studies Committee once other departments' minor offerings are known. See Attachment #3, for an illustration of potential elective sequences. Once other departments' course offerings are known, additional restrictions might become appropriate. In the absence of this information, ISE has decided by a unanimous vote of the faculty to defer to the decision of the ISE Undergraduate Studies Committee for the approval of technical elective courses.

8. Current and Proposed Advising Sheets

See Attachments #4 (current program requirement sheets and associated advising sheet) and Attachment #1 and #5 (proposed program requirements sheet and associated advising sheet, respectively).

9. Curriculum Map

See Attachment #2: BSISE Proposed Program (Curriculum Map)

10. Rationale for Program Changes and Description of Changes

This curriculum was developed in stages, with substantial input from faculty, advising staff, alumni, and current students. The initial stage began in WI 09, when members of the ISE Undergraduate Studies Committee undertook a benchmark analysis of curricula offered by 17 universities. It was clear that our current program was heavier in "engineering core" than the benchmark group, and failed to include some content that all other programs included. Effort toward revising the curriculum began in earnest during SU09. A group of 8 faculty members met repeatedly throughout the summer in an effort to initialize a view of a semester curriculum. When the faculty returned to duty in AU09, this provided a

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preliminary basis for discussion. The ISE Alumni Advisory Committee met on 9/25/09 and 4/16/10, permitting Advisory Committee input before the faculty began to work in earnest on the curriculum, and comments on the penultimate draft. Throughout AU09 and W110, the proposed curriculum was repeatedly revised and fine-tuned based on discussion among the faculty as a whole. Proposed courses were designed, discussed, revised, discussed, etc. Following this, the new curriculum was presented to current ISE students who responded to an open invitation for review and comment. The students offered several substantive suggestions, which have been incorporated in the attached document.

The primary curricular changes that resulted from this process are as follows:

- The Engineering Core is significantly streamlined in comparison to the quarter curriculum. This decision was made through several careful discussions involving all of the engineering majors. Among this group, a decision was made to favor depth in the major over breadth across Engineering. The net effect is that program quality improvements will result from better preparation in the major. As a result of this change, the ISE curriculum includes a larger number of SCH allocated to Technical Electives on semesters than on quarters.
- The ISE Core content in the proposed program bears a strong resemblance to the core content in the quarter curriculum, although there are notable changes. Students will have less flexibility in their choice of computer programming courses. This is primarily to ensure that our students develop familiarity with object-oriented programming. Students will be required to take a course in Probabilistic Models for Planning, which was previously absent in our curriculum but present in all of the curricula in our benchmark study. Students will be required to take a course in System Modeling in order to impart a stronger representation of “systems” concepts than was previously included in our curriculum. This course, in particular, will use systems concepts to draw connections to other engineering disciplines. Our quarter curriculum includes courses on “Statistical Process Control” and “Design of Engineering Experiments”. Our proposed curriculum includes a single course on “Quality Control and Improvement”, which will integrate these concepts into a single course.
- The Technical Elective portion of the proposed program is slightly larger than it is under quarters (12 SCH vs. 15 QCH). We will require that students take at least 6 SCH in ISE courses, and the combination of Technical Electives taken will be subject to the approval of the Undergraduate Studies Committee (under the quarter curriculum, technical electives are restricted to a specific allocation among lists of courses). This change is primarily spurred by comments obtained from graduating seniors in exit interviews over several years. These students have regularly identified frustrations over insufficient choice in the selection of technical electives. The proposed program includes two initial “pre-approved” lists of Technical Electives. We envision that this list will expand and/or contract as we evolve through this new curriculum.

The student response to the proposed curriculum has been uniformly positive. All of the students who have expressed opinions, either in the group meetings that were held or in one-on-one meetings with the academic advisor prefer the proposed curriculum to the current curriculum. The Alumni Advisory Committee’s response to the proposed curriculum was extremely favorable.

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11. Credit Hour Changes

	Number of QCH in current program	Calculated 2/3 of QCH in current program	Number of SCH required for proposed program
Total CH required for completion of program	193	128.67	127
Required CH offered by the unit	64-71	42.67-47.33	51-57
Required CH offered outside of the unit	122-129	81.33-86	70-76
Free Elective CH	0	0	0

12. Rationale for Significant Change in Credit Hours

In comparison to the current curriculum the proposed semester curriculum includes a 9-10 CH deviation in credit hours required in and out of ISE. The proposed curriculum includes three new courses: ISE 2010 Systems Modeling (3 SCH), ISE 3300 Probabilistic Models for Planning (3 SCH), ISE 3810 Implementation Strategy and Change Management (1 SCH). These new courses account for an additional 7 SCH. The remaining 2-3 are accounted for in some of the shifting credit hour counts that arise as a result of transitioning existing courses from quarters to semesters. Given the absence of free electives, the increase in CH required within ISE is necessarily matched by a decrease in CH required outside of ISE. Currently, the engineering core requires 45 QCH (i.e., 30 SCH) all of which are outside ISE. In the revised curriculum, the engineering core is reduced to 20 SCH.

13. Transition Policy

The transition plan is based on the premise that our semester curriculum will be approved and in effect no later than AU 11, one full year before the conversion to the semester calendar. Graduation requirements for all ISE Majors who initiate their studies during or after AU 11 will be those in effect for ISE Majors on the proposed curriculum. Graduation requirements for all ISE Majors who initiate their studies at OSU prior to AU 11 will be either those in effect for ISE Majors on the proposed curriculum, or those that are currently in effect, in accordance with individual student preferences. Our proposed curriculum eliminates some requirements in the current curriculum and includes additional requirements that are not currently present. Because of this, all current ISE majors, pre-majors, and prospective majors are already being advised in a manner that will facilitate planning for course schedules through the transition to a semester calendar. Without exception, every student thus far has expressed a strong preference for the proposed curriculum. Consequently, we anticipate that it is highly likely that from AU12 onward, graduation requirements will be those associated with the semester curriculum. We are, however, also prepared to accommodate the preferences of those students who might elect the current curriculum. See Attachment #6, Transition Curricula, Advising Sheets, and Credit Hour Accounting) for a detailed representation of the transition plans that will be put in place for each student affected by the transition to the semester calendar. Attachment #6 includes four transition plans, one for each combination of student "cohort" (defined as the autumn quarter in which they were/are NFQF, and assuming that they follow the recommended curriculum) and student "preference" (for either the semester- or quarter-based curriculum) for students who were NFQF in either Autumn 2009 or Autumn 2010. This attachment also includes a transition plan for students who are NFQF in Autumn 2011; these students will all follow the semester curriculum, because they will not enter the department as majors prior to the change to semesters. Students who are NFQF in WI, SP, or SU quarters and those who will have deviated from the recommended curriculum will follow the transition

A: Industrial and Systems Engineering (ISE) Program Proposal

plan that most closely aligns with their set of course completions as they begin the major. If it is determined that “normal” conditions covered by these four generic transition plans would result in a particular student facing an unavoidable delay in graduation compared to quarters as a result of the change to semesters rather than a student’s failure to make satisfactory progress through the program, then a revision of specific requirements will be worked out for that student by the advising staff with approval by the ISE Undergraduate Studies Committee.

The transition plan adheres to the following principles:

- The switch to semesters will not increase the number of credit hours that a student must take in order to satisfy graduation requirements by more than one QCH.
- Graduation requirements may vary, depending on when the student first enrolled in OSU. For those who first enroll during or after AU 11, the requirements will follow the proposed curriculum. All others may choose either the current curriculum or the proposed curriculum.
- Semester program requirements may be met either by taking semester courses, or via a substantially similar learning experience obtained through quarter course(s).
- Deviations from credit-hour requirements, whether positive or negative deviations, will be accounted as described in Attachment #6.
- Transition courses will be offered beginning in Spring, 2011 to ease the transition from quarter courses to semester courses, as identified in Attachment #6. By offering these courses to current students prior to the semester change, we can ensure that they will graduate on schedule under the new curriculum.
- All transition curriculum plans meet the requirements of our accreditation, as defined by ABET.

As indicated in Attachment #6, we anticipate a need for three transition courses to ensure that NFQF '09 students who elect the semester curriculum will be able to meet graduation requirements. The content in these courses will be offered during AY 11-12 (on quarters) and during AY 12-13 (on semesters). Students who cannot or choose not to follow the standard schedule will be advised individually by the advising staff to minimize the effect of the transition to semesters. We will facilitate the transition by offering the courses required on the transition curricula that appear in Attachment #6. If at the end of AY 12-13 it appears that a significant number of students are still in transition, we will offer the necessary transition courses again in AY 13-14. Syllabi for the transition courses to be offered after the switch to semesters are included with the collection of new syllabi to be reviewed. Syllabi for the version of these transition courses that will be offered prior to the switch to quarters will follow the normal course approval process.

14. Assessment Practices

We have developed assessment practices to systematically evaluate our program outcomes and objectives. Our assessment of program outcomes incorporates both direct and indirect assessment measures including evaluation of student work by outside professionals working in the field of Industrial Engineering, samples of student writing, evaluation of presentation quality scores, and an exit survey. Our assessment of program objectives is conducted via the College of Engineering Alumni Survey process which typically occurs every two years. All data are reviewed by the department's assessment committee, and where there are deficiencies, the undergraduate studies committee is consulted to determine the appropriate corrective actions.

15. Assessment Plan on File with OAA

ISE has a detailed assessment plan which is on file with our curricular Dean for final submission to OAA.

Industrial and Systems Engineering (ISE) Program Proposal: Attachments

List of Attachments:

- #1: Proposed Program Requirements
- #2: Proposed Curriculum Map, Comparison Table, and BSISE “Bingo” Sheet
- #3: Illustrative Elective Sequences
- #4: Current Requirements and Advising Sheet
- #5: Proposed Advising Sheet
- #6: Transition Curricula Plans, Advising Sheets, and Credit Hour Accounting

Attachment #1: Proposed Program Requirements

General Education	Course Number	CH
Gen Ed		3
Gen Ed		3
Gen Ed		3
Gen Ed		3
Gen Ed		3
Gen Ed		3
Gen Ed		3
English 1100:	English 1100	3
Total General Education Course Number		24
Engineering Core	Course Number	CH
Eng Survey	ENG 1100	1
Intro Engineering I	ENG 1181	2
Intro Engineering II	ENG 1182	2
Engineering Calculus I	Math 1151	5
Engineering Math A	Math 1172	5
Physics I	Physics 1251	5
Total Engineering Core CH		20
ISE Core	Course Number	CH
Computer Programming	CSE 1222	3
Additional science*	Physics 1251 or Biology 2100 or Chem 1250	3
Additional science*	Physics 1251 or Biology 2100 or Chem 1250	4
Engineering science		3
Intro to ISE; 1/2 Sem.	ISE 2000	1.5
Systems Modeling	ISE 2010	3
Engineering Economics	ISE 2040	2
Design of Work; 1/2 Sem.	ISE 2400	1.5
Intro to Manufacturing Eng	ISE 2500	3
Opt. for Enterprise Systems	ISE 3200	3
Opt. for System Design	ISE 3210	3
Prob. Models for Planning	ISE 3300	3
Production Planning	ISE 3400	3
Facilities Planning	ISE 3410	3
Workplace Ergonomics	ISE 3600	3
Cog. Systems Engineering	ISE 3700	3
Project Management	ISE 3800	2
Implementation & Change Management	ISE 3810	1
Quality Control & Improvement	ISE 4120	3
Capstone Design	ISE 4900	4
Discrete Event Simulation	ISE 5310	3
Engineering Math B	Math 2173	3
Engineering Math C	Math 2174	3
Statics/Strength of Mat.	ME 2040	4
Probability and Statistics	Stat 3470	3
Total ISE Core CH		71
Technical Elective	Course Number	CH
Technical Elective		3
Technical Elective		3
Technical Elective		3
Technical Elective		3
Total Technical Elective CH		12

Attachment #2: Proposed Curriculum Map, Course Comparison Table, and BSISE “Bingo” Sheet

Curriculum Map for the BS degree in Industrial and Systems Engineering

Program Outcomes Key: *** significant contribution; ** substantial contribution; * some contribution

	a	b	c	d	e	f	g	h	i	j	k
Required ISE Courses											
ISE 2000	*				*	**	**	***	***	***	
ISE 2010	***		***		***			*		*	***
ISE 2040	**		*		***			**			***
ISE 2400	**		***	*	***	**	**	*		*	**
ISE 2500	***	**	**		**		**	*	*	**	***
ISE 3200	***	*	***		***		**	***	*	**	***
ISE 3210	***	*	***		***		*	***	*	**	***
ISE 3300	**		**		***				*		**
ISE 3400	***	*	***		***		*	***	*	**	***
ISE 3410	**	*	***		**	*	***	**	*	***	***
ISE 3600	**	**	*	**	***	*	**			*	***
ISE 3700	***	*	***	**	***	*	**	*	**	*	***
ISE 3800			***	*	**	*	*				***
ISE 3810			**								
ISE 4120	***	***	**		**		*	*		*	**
ISE 4900	**	**	**	***	**	**	**	*	**	*	**
ISE 5310	**	**	*		**				*		**
Technical electives											***
Other Required Courses											
Engineering 1100											
Engineering 1181	***		**	**	*	**	**				**
Engineering 1182	***		***	**							**
CSE 1222	**				***						***
Mathematics 1151, 1172	***				***						***
Mathematics 2173, 2174	***				***						***
Physics 1250	***	***									***
Physics or Chemistry or Biology	***	***									***
Mechanical Engineering 2040	***				***						
Statistics 3470	***										
General Education Courses					***	***	**	***	*	***	

Key to Program Outcomes for Industrial & Systems Engineering

Outcome

- a An ability to apply knowledge of mathematics, science and engineering
- b An ability to design and conduct experiments, as well as to analyze and interpret data
- c An ability to design a system, component, or process to meet desired needs
- d An ability to function on multi-disciplinary teams
- e An ability to identify, formulate, and solve engineering problems
- f An understanding of professional and ethical responsibility
- g An ability to communicate effectively
- h The broad education necessary to understand the impact of engineering solutions in a global and societal context
- i A recognition of the need for, and an ability to engage in, life-long learning
- j A knowledge of contemporary issues
- k An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Comparison of Quarter and Semester Industrial and Systems Engineering Core Curricula

Quarter Course Number, (Hours)	Course Title	Semester Course Number, (Hours)	Course Title	Comments
350 (3)	Manufacturing Engineering	2500 (3)	Intro to Manufacturing Eng.	Conversion of 350
500 (3)	Intro to Industrial and Systems Engineering	2000 (1.5)	Introduction to ISE	Conversion of 500 (a)
		2010 (3)	Systems Modeling	New course; (b)
501 (5)	Simulation	5310 (3)	Discrete Event Simulation	Conversion of 501
504 (3)	Engineering Economics	2040 (2)	Engineering Economics	Conversion of 504
		2050 (1.5)	Design of Work	New course (c)
510 (3)	Statistical Process Control	4120 (3)	Quality Control & Improvement	New course (d)
520 (3)	Linear Optimization	3200 (3)	Opt. for Enterprise Systems	Conversion of 520
521 (3)	Non-linear Optimization	3210 (3)	Opt. for System Design	Conversion of 521
540 (4)	Production Systems Design	3400 (3)	Production Planning	Conversion of 540
541 (4)	Facilities Design	3410 (3)	Facilities Design	Conversion of 541
542 (4)	Production Control	3300 (3)	Probabilistic Models for Planning	Conversion of 542
550 (3)	Principles of Manufacturing Processes			Course discontinued
560 (3)	Work Physiology and Biomechanics in Work Design	3600 (3)	Workplace Ergonomics	Conversion of 560
610 (3)	Planning Engineering Experiments	4120 (3)	Quality Control & Improvement	New course (d)
670 (3)	Cognitive Engineering	3700 (3)	Cognitive Systems Engineering	Conversion of 670
680 (8)	Capstone Design	4900 (4)	Capstone design	Conversion of 680
681	Project Management	3800 (3)	Project management	Conversion of 681
		3810 (1)	Change management	New course (e)

Notes:

- a) ISE 2000 contains a subset of the topics covered in ISE 500; some of this material is transferred to new ISE 2050.
- b) ISE 2010 is a new course in systems modeling, that resulted from benchmarking comparable programs as well as alumni surveys.
- c) ISE 2050 will contain material previously covered in ISE 500 and ISE 560.
- d) ISE 4120 combines topics previously covered in ISE 509 and ISE 610. Course material from 509 and 610 not covered in 4120 will be covered in technical electives.
- e) ISE 3810 is a new course in change management, resulting from input from our Industrial Advisory Board, alumni, and other engineering departments.

Semester: 1/1		Semester: 1/2	
Physics 1251: Physics I	5	Math 1172: Engineering Math A	5
Math 1151: Engineering Calculus I	5	ENG 1182: Intro Engineering II	2
ENG 1181: Intro Engineering I	2	CSE 1222: Computer Programming	3
ENG 1100: Eng Survey	1	English 1100:	3
Gen Ed	3	Additional science*	4
Total:	16	Total:	17
Semester: 2/1		Semester: 2/2	
Math 2173: Engineering Math B	3	Math 2174: Engineering Math C	3
Stat 3470: Probability and Statistics	3	ISE 2000: Intro to ISE; 1/2 Sem.	1.5
ME 2040: Statics/Strength of Mat.	4	ISE 2010: Systems Modeling	3
ISE 2040: Engineering Economics	2	ISE 2400: Design of Work; 1/2 Sem.	1.5
Additional science*	3	ISE 2500: Intro to Manufacturing Eng	3
Gen Ed	3	Engineering science	3
		Gen Ed	3
Total:	18	Total:	18
Semester: 3/1		Semester: 3/2	
ISE 3200: Opt. for Enterprise Systems	3	ISE 3210: Opt. for System Design	3
ISE 3300: Prob. Models for Planning	3	ISE 3410: Facilities Planning	3
ISE 3400: Production Planning	3	ISE 3700: Cog. Systems Engineering	3
ISE 3600: Workplace Ergonomics	3	ISE 4120: Quality Control & Improvement	3
Gen Ed	3	Gen Ed	3
Total:	15	Total:	15
Semester: 4/1		Semester: 4/2	
ISE 3800: Project Management	2	ISE 4900: Capstone Design	4
ISE 3810: Implementation & Change Managem	1	Technical Elective	3
ISE 5310: Discrete Event Simulation	3	Technical Elective	3
Technical Elective	3	Gen Ed	3
Technical Elective	3		
Gen Ed	3		
Total:	15	Total:	13

Total Credit Hours 127

*Additional Science

Physics 1251 (5) Physics II

Chemistry 1250 (4) Chemistry for Engineers

Biology 2100 (3) Biological Analysis

Attachment #3: Illustrative Elective Sequences

Attachment #3: Illustrative Elective Sequences

Manufacturing:

ISE 4500 (Manufacturing Process Engineering)

ISE 5110 (Design of Engineering Experiments)

One of:

ISE 5510 (Fundamentals of Solid State Processing)

ISE 5520 (Fundamentals of Liquid Shaping Processes)

One of:

ISE 5530 (Fundamentals of Tool Engineering)

ISE 5540 (Polymer Processing Fundamentals)

ISE 5550 (Principals of Precision Engineering)

Management Systems

ISE 5110 Design of Experiments

ISE 5410 Quantitative Models in Production and Distribution Logistics

Business Elective

One of:

ISE 5810 Lean Sigma Foundations

ISE 5830 Decision Analysis

Attachment #4: Current Requirements and Advising Sheet

General Education	Course Number	QCH
GEC	English 110	5
GEC	Psych 100	5
GEC	Econ 200	5
GEC	2nd Writing GEC	5
GEC	GEC	5
GEC	GEC	5
GEC	GEC	5
Total General Education Course Number		35
Engineering Core	Course Number	QCH
Math	Math 151	5
	Math 152	5
	Math 153	5
Science	Chem 121	5
	Physics 131	5
	Physics 132	5
	Additional Sci	4
Computing	CSE 294/202; EG 167	4
Engineering Core	Eng 100	1
	Eng 181	3
	Eng 183	3
Total Engineering Core CH		45
ISE Core	Course Number	QCH
Calc & Analytic Geometry	Math 254	5
Differential Equations	Math 255 or 415	5
Linear Algebra	Math 568 or 571	3
Prob & Stat I	Stat 427	3
Prob & Stat II	Stat 428	3
Statics	ME 410	4
Strength of Materials	ME 420	4
Dynamics	ME 430	4
Intro to MSE	MSE 205	3
Electrical Circuits	ECE 300 & 309	4
Accounting	Acct 501	3
Manufacturing Engineering	ISE 350	3
Introduction to ISE	ISE 500	3
Simulation	ISE 501	5
Engineering Economics	ISE 504	3
Statistical Process Control	ISE 510	3
Linear Optimization	ISE 520	3
Nonlinear Optimization	ISE 521	3
Production Systems Design	ISE 540	4
Facilities Design	ISE 541	4
Production Control	ISE 542	4
Princ Mfg Processes	ISE 550	3
Phys Biomech Work Des	ISE 560	3
Planning Engineering Experiments	ISE 610	3
Cognitive Engineering	ISE 670	3
Capstone Design I & II	ISE 680.01 & 680.02	8
Project Management	ISE 681	3
Total ISE Core CH		68
Technical Elective	Course Number	QCH
Technical Elective		3
Technical Elective		3
Technical Elective		3
Technical Elective		3
Technical Elective		3
Total Technical Elective CH		15

Undergraduate Program in Industrial and Systems Engineering
The Ohio State University
Effective Spring 2005 (new #s WI'09)

COURSES WHICH MUST BE COMPLETED BEFORE APPLYING TO ISE MAJOR:

Student must have at least a 2.0 Cum GPA and at least a 2.0 cumulative in these courses (OR in their equivalent courses):

ENG 181 (3) (or ENG H191) _____
ENG 183 (3) (or ENG H193) _____

CSE 202 (4) _____
(or: ENG H192, CSE294P, or EngGraph 157)

ENGLISH 110.XX (5) _____

MATH 151.XX (5) _____
152.XX (5) _____
153.XX (5) _____

PHYSICS 131 (5) _____
132 (5) _____

OTHER COURSES TO BE TAKEN BEFORE BEGINNING ISE MAJOR CORE COURSES:

CHEM 121 (5) _____

ADDITIONAL SCIENCE (choose one:
Chem 122, Chem 125 or Physics 133 _____

ME 410 (4) _____

ME 420 (4) _____

ME 430 (4) _____

MATH 254.XX (5) _____

MATH 255.XX (5) or 415.XX (4) _____

MATH 571 or 568 (3) _____

STATISTICS 427 (3) _____

STATISTICS 428 (3) _____

ECON 200 (5) _____

PSYCH 100 (5) _____

2nd WRITING GEC (5) _____

ACCTG 501 (3) _____

ISE 350 (3) _____

ISE 504 or H504 (3) _____

ISE 500 (3) _____

SEQUENCE OF COURSES FOR STUDENTS WHO BEGIN ISE CORE IN AUTUMN
Apply to major by preceding January 10

AUTUMN	WINTER	SPRING	AUTUMN	WINTER
ISE 501 (5)	ISE 521 (3)	ISE 541 (4)	ISE 680.01 (4)	ISE 680.02 (4)
ISE 520 (3)	ISE 540 (4)	ISE 542 (4)	ISE 610 (3)	MSE 205 (3)
ISE 560 (3)	ISE 670 (3)	ISE 681 (3)	TECH ELEC	TECH ELEC
ECE 300 (3)	ISE 550/H550 (3)	ISE 510 (3)	TECH ELEC	TECH ELEC
ECE 309 (1)				

SEQUENCE OF COURSES FOR STUDENTS WHO BEGIN ISE CORE IN WINTER
Apply to major by preceding April 10

WINTER	SPRING	AUTUMN	WINTER	SPRING
ISE 501 (5)	ISE 521 (3)	ISE 541 (4)	ISE 680.01 (4)	ISE 680.02 (4)
ISE 520 (3)	ISE 540 (4)	ISE 542 (4)	ISE 610 (3)	MSE 205 (3)
ISE 560 (3)	ISE 670 (3)	ISE 681 (3)	TECH ELEC	TECH ELEC
ECE 300 (3)	ISE 550/H550 (3)	ISE 510 (3)	TECH ELEC	TECH ELEC
ECE 309 (1)				

Attachment #5: Proposed Advising Sheet

Undergraduate Program in Industrial and Systems Engineering
The Ohio State University
NFQF Autumn 2012

COURSES WHICH MUST BE COMPLETED BEFORE APPLYING TO THE MAJOR:

Student must have at least a cumulative 2.0 GPA and at least a 2.0 cumulative in these courses or their equivalents:

Engineering 1181 (2)
Engineering 1182 (2)
CSE 1222 (3)
MATH 1151 (5)
MATH 1172 (5)
PHYSICS 1250 (5)

ADDITIONAL PREREQUISITES WHICH MUST BE COMPLETED BEFORE BEGINNING ISE MAJOR CORE COURSES:

ENG 1100 (1)
ENGLISH 1100 (3)
MATH 2173 (3)
MATH 2174 (3)
STAT 3470 (3)
Additional Science: Choose 7 CH from:
PHYSICS 1251 (5)
CHEMISTRY 1250 (4)
BIOLOGY 2100 (3)

ENG Science (3)
ME 2040 (4)
ISE 2000 (1.5)
ISE 2010 (3)
ISE 2040 (2)
ISE 2400 (1.5)
ISE 2500 (3)

Sequence of courses for students who begin ISE core in Autumn Semester

AU	SP	AU	SP
ISE 3200 (3)	ISE 3210 (3)	ISE 3800, 3810 (2, 1)	ISE 4900 (4)
ISE 3300 (3)	ISE 3410 (3)	ISE 5310 (3)	Tech Elec (3)
ISE 3400 (3)	ISE 3700 (3)	Tech Elec (3)	Tech Elec (3)
ISE 3600 (3)	ISE 4120 (3)	Tech Elec (3)	Gen Ed (3)

Sequence of courses for students who begin ISE core in Spring Semester

SP	AU	SP	AU
ISE 3200 (3)	ISE 3210 (3)	ISE 3800, 3810 (2, 1)	ISE 4900 (4)
ISE 3300 (3)	ISE 3410 (3)	ISE 5310 (3)	Tech Elec (3)
ISE 3400 (3)	ISE 3700 (3)	Tech Elec (3)	Tech Elec (3)
ISE 3600 (3)	ISE 4120 (3)	Tech Elec (3)	Gen Ed (3)

An additional 21 credit hours of general education courses are required for graduation.

Attachment #6: Transition Curricula Plans, Advising Sheets, and Credit Hour Accounting

The following pages include the primary transition plans for ISE majors. They are presented based on the quarter in which the student initiates studies at OSU (NFQF09, NFQF10, and NFQF11) and the curriculum that the student wishes to follow (Semester or Quarter) for NFQF09 and NFQF10 students. All NFQF11 students will follow the Semester Plan after their first year. Consequently, there are five distinct transition plans.

Each plan identifies the program requirements and the manner in which they will be fulfilled. For courses to be taken after the calendar transition, we have identified the semester in which the course is scheduled to be taken. Credit hour accounting is based on 1 SCH = 1.5 QCH. Credit hour differentials are accounted for to the fullest extent possible. Where we have determined that surpluses/shortages are unavoidable, these have been accumulated and allocated against technical electives. In doing this, none of the four plans shows a total credit hour difference of more than 1QCH.

In reviewing the transition curricula, please note that the credit hour accounting is based on the curriculum plan being presented. Thus, for students following the semester curriculum the accounting is in SCH, while for students following the quarter curriculum the accounting is in QCH.

NFQF AU09 (Begin ISE Major in AU11; Graduate in SP13), SEMESTER OPTION

Courses Completed Prior to AU11 (on Quarters)		
Math 151: (5) Math 152: (5) Math 153: (5) Math 254: (5) Math 255 or 415: (5) Math 568 or 571: (3) Stats 427: (3) Stats 428: (3) Engr 100: (1) Engr 181: (3) Engr 183: (3)	Physics 131: (5) Physics 132: (5) Additional Science (4) English 110: (5) Psych 100: (5) Econ 200: (5) 2 nd Writing GEC (5) GEC1 (5)	CSE 202/205 or EG 167: (4) ME 410: Statics (4) ME 420: Strength of Materials (4) ISE 350: (3) ISE 500: Intro to ISE (3) ISE 504: Engineering Economics (3) ISE 599.1L: Systems Modeling (5)
AU 11 (First Qtr as ISE Major)	WI 12	SP 12
ISE 501: Simulation (5) ISE 520: Linear Optimization (3) ISE 560: Phys Biomech Work Des (3) ISE 599.2G: Mfg Bridge Course (4)	ISE 521: Nonlinear Optimization (3) ISE 540: Prod Systems Design (4) ISE 670: Cognitive Engineering (3) HF Elective (3)	ISE 510: Stat Process Control (3) ISE 541: Facilities Design (4) ISE 542: Production Control (4) ISE 599.3G: Opt. Bridge Course (3) GEC2 (3)
AU12	SP 13	
ISE 3300: Prob. Models for Planning (3) ISE 3800: Project Mangement (2) ISE 3810: Implementation & Change Mgmt (1) Technical Elective (3) Gen Ed (3)	ISE 4900: Capstone Design (4) Technical Elective (3) Technical Elective (3)	

General Education	Course Number	SCH	Class Taken	QCH	Sem Taken	SCH	SCH Differential (Taken - Required)	Reallocated SCH	Net Change in SCH	Notes / Resolution
Gen Ed 1		3	Psych 100	5						
Gen Ed 2		3	Econ 200	5						
Gen Ed 3		3	2nd Writ. GEC	5						
Gen Ed 4		3	GEC1	5						
Gen Ed 5		3	GEC2	5						
Gen Ed 6		3	Gen Ed (Sem.)		AU12	3				
Gen Ed 7		3								
English 1100:	English 1100	3	English 110	5						
Total General Education Course Number		24		30		3	-1.00		-1.00	T1: Tech Elective
Engineering Core										
Eng Survey	ENG 1100	1	ENG 100	1			-0.33		-0.33	
Intro Engineering I	ENG 1181	2	ENG 181	3						
Intro Engineering II	ENG 1182	2	ENG 183	3						
Engineering Calculus I	Math 1151	5								
Engineering Calculus II	Math 1152	5	Math 151, 152, 153	15						
Physics I	Physics 1151	5	Phys 131,132	10			1.67	-1.00	0.67	A: Add'l Science
Total Engineering Core CH		20		32					0.33	T2: Tech Elective
ISE Core										
Additional science		4	Chem 121	5			-0.67	0.67		A1: from A
Additional Science		3	Additional Sci	4			-0.33	0.33		A2: from A
Engineering science		3					-3.00	3.00		B: B1, B2, B3
Computer Programming	CSE 1222	3	CSE / EG	4			-0.33		-0.33	
*** Prereq for Math 255 and 415	n/a		*** Math 254	5			3.33		3.33	
Differential Equations	Math 2xxx	3	Math 255 or 415	5			0.33		0.33	
Linear Algebra	Math 2xxx	3	Math 568 or 571	3			-1.00		-1.00	
Statics/Strength of Mat.	ME 2040	4	ME 410, 420	8			1.33	-1.33		B1: Eng Science
Probability and Statistic	Stat 4278	3	Stat 427,428	6			1.00		1.00	
Intro to ISE; 1/2 Sem.	ISE 2000	1.5	ISE 500	3			0.50	-0.50		B2: Eng Science
Systems Modeling	ISE 2010	3	ISE 599.1L	5			0.33		0.33	
Engineering Economics	ISE 2040	2	ISE 504	3						
Design of Work; 1/2 Sem.	ISE 2400	1.5	ISE 540	4			1.17	-1.17		B3: Eng Science
Intro to Manufacturing Eng	ISE 2500	3	ISE 350	3			-1.00	1.00		D: Mfg Bridge
Opt. for Enterprise Systems	ISE 3200	3	ISE 520	3			-1.00	1.00		C: Opt Bridge
Opt. for System Design	ISE 3210	3	ISE 521	3			-1.00	1.00		C: Opt Bridge
Prob. Models for Planning	ISE 3300	3			AU12	3				
Production Planning	ISE 3400	3	ISE 542	4			-0.33	0.33		D: Mfg Bridge
Facilities Planning	ISE 3410	3	ISE 541	4			-0.33	0.33		D: Mfg Bridge
Workplace Ergonomics	ISE 3600	3	ISE 560	3			-1.00	1.00		E: HF Elective
Cog. Systems Engineering	ISE 3700	3	ISE 670	3			-1.00	1.00		E: HF Elective
Eng. Project Management	ISE 3800	2			AU12	2				
Implementation & Change Mgmt	ISE 3810	1			AU12	1				
Quality Control & Improvement	ISE 4120	3	ISE 510	3			-1.00	1.00		D: Mfg Bridge
Capstone Design	ISE 4900	4			SP13	4				
Discrete Event Simulation	ISE 5310	3	ISE 501	5			0.33		0.33	
Total ISE Core CH		71		86		10			4.00	T3: Tech Elective
Technical Elective										
Technical Elective		3			AU12	3				
Technical Elective		3			SP13	3				
Technical Elective		3			SP13	3				
Technical Elective		3								T1+T2+T3
Total Technical Elective CH		12				9	-3.00	3.33	0.33	Final Differential

Additional Transition Courses		SCH	Target of SCH allocations
C: Optimization "Transition"	ISE 599.3G (3QCH)	2	ISE 3200, 3210
D: Manufacturing "Transition"	ISE 599.2G (4QCH)	2.67	ISE 2500, 3400, 3410,4120
E: HF Elective	Elective (3QCH)	2	ISE 3600, 3700

NFQF AU10 (Begin ISE Major in AU12; Graduate in SP14), SEMESTER OPTION

Courses Completed Prior to AU12 (on Quarters)		
Math 151: (5) Math 152: (5) Math 153: (5) Math 254: (5) Math 255 or 415: (5) Math 568 or 571: (3) Stats 427: (3) Stats 428: (3) Engr 100: (1) Engr 181: (3) Engr 183: (3)	Physics 131: (5) Physics 132: (5) Chem 121 (4) Additional Science (4) English 110: (5) Psych 100: (5) Econ 200: (5) GEC 1 (5)	CSE 202/205 or EG 167: (4) ME 410: Statics (4) ME 420: Strength of Materials (4) ISE 350: (3) ISE 500: Intro to ISE (3) ISE 504: Engineering Economics (3) ISE 599.1L: Sys Modeling (5) ISE 599.2L: Design of Work (2)
AU12 (First Semester as ISE Major)	SP 13	
ISE 3200: Opt. for Enterprise Systems (3) ISE 3300: Prob. Models for Planning (3) ISE 3400: Production Planning (3) ISE 3600: Workplace Ergonomics (3) Gen Ed (3)	ISE 3210: Opt. for System Design (3) ISE 3410: Facilities Planning (3) ISE 3700: Cog. Systems Engineering (3) ISE 4120: Quality Control and Imp. (3) Gen Ed (3)	
AU13	SP14	
ISE 3800: Project Mangement (2) ISE 3810: Implementation & Change Mgmt (1) ISE 5310: Discrete Event Simulation (3) Technical Elective (3) Technical Elective (3) Gen Ed (3)	ISE 4900: Capstone Design (4) Technical Elective (3) Technical Elective (3) Gen Ed (3)	

General Education	Course Number	SCH	Class Taken	QCH	Sem Taken	SCH	SCH Differential (Taken - Required)	Reallocated SCH	Net Change in SCH	Notes / Resolution
Gen Ed 1		3	Psych 100	5						
Gen Ed 2		3	Econ 200	5						
Gen Ed 3		3	GEC1	5						
Gen Ed 4		3	Gen Ed (Sem.)		AU12	3				
Gen Ed 5		3	Gen Ed (Sem.)		SP13	3				
Gen Ed 6		3	Gen Ed (Sem.)		AU13	3				
Gen Ed 7		3	Gen Ed (Sem.)		SP14	3				
English 1100:	English 1100	3	English 110	5						
Total General Education Course Number		24		20		12	1.33		1.33	T1: Tech Elective
Engineering Core	Course Number	SCH								
Eng Survey	ENG 1100	1	ENG 100	1			-0.33		-0.33	
Intro Engineering I	ENG 1181	2	ENG 181	3						
Intro Engineering II	ENG 1182	2	ENG 183	3						
Engineering Calculus I	Math 1151	5								
Engineering Calculus II	Math 1152	5	Math 151, 152, 153	15						
Physics I	Physics 1151	5	Phys 131,132	10			1.67	-1.00	0.67	A: Add'l Science
Total Engineering Core CH		20		32					0.33	T2: Tech Elective
ISE Core	Course Number	SCH								
Additional science		4	Chem 121	5			-0.67	0.67		A1: from A
Additional Science		3	Additional Sci	4			-0.33	0.33		A2: from A
Engineering science		3					-3.00	3.00		B1, B2, B3
Computer Programming	CSE 1222	3	CSE / EG	4			-0.33		-0.33	
*** Prereq for Math 255 and 415	n/a		*** Math 254	5			3.33		3.33	
Differential Equations	Math 2xxx	3	Math 255 or 415	5			0.33		0.33	
Linear Algebra	Math 2xxx	3	Math 568 or 571	3			-1.00		-1.00	
Statics/Strength of Mat.	ME 2040	4	ME 410, 420	8			1.33	-1.33		B1: Eng Science
Probability and Statistic	Stat 4278	3	Stat 427,428	6			1.00		1.00	
Intro to ISE; 1/2 Sem.	ISE 2000	1.5	ISE 500	3			0.50	-0.50		B2: Eng Science
Systems Modeling	ISE 2010	3	ISE 590.1L	5			0.33		0.33	
Engineering Economics	ISE 2040	2	ISE 504	3						
Design of Work; 1/2 Sem.	ISE 2400	1.5	ISE 590.2L	2			-0.17	-1.17	-1.33	B3: Eng Science
Intro to Manufacturing Eng	ISE 2500	3	ISE 350	3			-1.00		-1.00	
Opt. for Enterprise Systems	ISE 3200	3			AU12	3				
Opt. for System Design	ISE 3210	3			SP13	3				
Prob. Models for Planning	ISE 3300	3			AU12	3				
Production Planning	ISE 3400	3			AU12	3				
Facilities Planning	ISE 3410	3			SP13	3				
Workplace Ergonomics	ISE 3600	3			AU12	3				
Cog. Systems Engineering	ISE 3700	3			SP13	3				
Eng. Project Management	ISE 3800	2			AU13	2				
Implementation & Change Mgmt	ISE 3810	1			AU13	1				
Quality Control & Improvement	ISE 4120	3			SP13	3				
Capstone Design	ISE 4900	4			SP14	4				
Discrete Event Simulation	ISE 5310	3			AU13	3				
Total ISE Core CH		71		56		34			1.33	T3: Tech Elective
Technical Elective	Course Number	SCH								
Technical Elective		3			AU12	3				
Technical Elective		3			SP13	3				
Technical Elective		3			SP13	3				
Technical Elective		3						3.00		T1+T2+T3
Total Technical Elective CH		12				9	-3.00	3.00		Final Differential

NFQF AU09 (Begin ISE Major in AU11; Graduate in SP13) QUARTER OPTION

Courses Completed Prior to AU 11 (on Quarters)		
Math 151: (5) Math 152: (5) Math 153: (5) Math 254: (5) Math 255 or 415: (5) Math 568 or 571: (3) Stats 427: (3) Stats 428: (3) Engr 100: (1) Engr 181: (3) Engr 183: (3)	Physics 131: (5) Physics 132: (5) Chem 121: (5) Additional Science (4) English 110: (5) Psych 100: (5) Econ 200: (5) 2 nd Writing GEC (5) GEC1 (5) GEC2 (5) GEC3 (5) Acctg 501: (3)	CSE 202/205 or EG 167: (4) ME 410: Statics (4) ME 420: Strength of Materials (4) ME 430: Dynamics (4) ISE 350: (3) ISE 500: Intro to ISE (3) ISE 504: Engineering Economics (3)
AU 11 (First Qtr as ISE Major)	WI 12	SP 12
ISE 501: Simulation (5) ISE 520: Linear Optimization (3) ISE 560: Phys Biomech Work Des (3) ECE 300 & 309: (4)	ISE 521: Nonlinear Optimization (3) ISE 540: Prod Systems Design (4) ISE 550: Princ Mfg Processes (3) ISE 670: Cognitive Engineering (3) MSE 205: Intro to MSE (3)	ISE 510: Stat Process Control (3) ISE 541: Facilities Design (4) ISE 542: Production Control (4) ISE 610: Plng for Eng Exp (3) ISE 681: Project Management (3)
AU12	SP 13	
Technical Elective (3) Technical Elective (3) Technical Elective (3)	ISE 4900: Capstone Design (4) Technical Elective (3) Technical Elective (3)	

General Education	Course Number	QCH	Class Taken	QCH	Sem Taken	SCH	QCH Differential (Taken - Required)	Reallocated QCH	Net Change in QCH	Notes / Resolution
GEC	English 110	5	English 110	5						
GEC	Psych 100	5	Psych 100	5						
GEC	Econ 200	5	Econ 200	5						
GEC	2nd Writing GEC	5	2nd Writing GEC	5						
GEC	GEC	5	GEC1	5						
GEC	GEC	5	GEC2	5						
GEC	GEC	5	GEC3	5						
Total General Education Course Number		35		35						
Engineering Core										
Math	Math 151	5	Math 151	5						
	Math 152	5	Math 152	5						
	Math 153	5	Math 153	5						
Science	Chem 121	5	Chem 121	5						
	Physics 131	5	Physics 131	5						
	Physics 132	5	Physics 132	5						
	Additional Sci	4	Additional Sci	4						
Computing	CSE 202/205; EG 167	4	CSE 202/205 or EG 167	4						
Engineering Core	Eng 100	1	Eng 100	1						
	Eng 181	3	Eng 181	3						
	Eng 183	3	Eng 181	3						
Total Engineering Core CH		45		45						
ISE Core										
Calc & Analytic Geometry	Math 254	5	Math 254	5						
Differential Equations	Math 255 or 415	5	Math 255 or 415	5						
Linear Algebra	Math 568 or 571	3	Math 568 or 571	3						
Prob & Stat I	Stat 427	3	Stat 427	3						
Prob & Stat II	Stat 428	3	Stat 428	3						
Statics	ME 410	4	ME 410	4						
Strength of Materials	ME 420	4	ME 420	4						
Dynamics	ME 430	4	ME 430	4						
Intro to MSE	MSE 205	3	MSE 205	3						
Electrical Circuits	ECE 300 & 309	4	ECE 300 & 309	4						
Accounting	Acctg 501	3	Acctg 501	3						
Manufacturing Engineering	ISE 350	3	ISE 350	3						
Introduction to ISE	ISE 500	3	ISE 500	3						
Simulation	ISE 501	5	ISE 501	5						
Engineering Economics	ISE 504	3	ISE 504	3						
Statistical Process Control	ISE 510	3	ISE 510	3						
Linear Optimization	ISE 520	3	ISE 520	3						
Nonlinear Optimization	ISE 521	3	ISE 521	3						
Production Systems Design	ISE 540	4	ISE 540	4						
Facilities Design	ISE 541	4	ISE 541	4						
Production Control	ISE 542	4	ISE 542	4						
Princ Mfg Processes	ISE 550	3	ISE 550	3						
Phys Biomech Work Des	ISE 560	3	ISE 560	3						
Planning Eng Experiments	ISE 610	3	ISE 610	3						
Cognitive Engineering	ISE 670	3	ISE 670	3						
Capstone Design I & II	ISE 680.01 & 680.02	8	ISE 4900	3	SP 13	4	-2.00		-2.00	
Project Management	ISE 681	3	ISE 681	3						
Total ISE Core CH		99		91		4			-2.00	T1: Tech Elective
Technical Elective										
Technical Elective		3			AU 12	3		-2.00		T1
Technical Elective		3			AU 12	3				
Technical Elective		3			SP 13	3				
Technical Elective		3			SP 13	3				
Technical Elective		3								
Total Technical Elective CH		15				12	3.00	-2.00	1.00	Final Differential

NFQF AU10(Begin ISE Major in AU12; Graduate in SP14) QUARTER OPTION

Courses Completed Prior to AU12 (on Quarters)		
Math 151: (5) Math 152: (5) Math 153: (5) Math 254: (5) Math 255 or 415: (5) Math 568 or 571: (3) Stats 427: (3) Stats 428: (3) Engr 100: (1) Engr 181: (3) Engr 183: (3)	Physics 131: (5) Physics 132: (5) Chem 121 (5) Additional Science (4) English 110: (5) 2 nd Writing GEC (5) Psych 100: (5) Econ 200: (5) GEC 1(5) GEC2 (5) Acctg 501: (3)	CSE 202/205 or EG 167: (4) ME 410: Statics (4) ME 420: Strength of Materials (4) ME 430: Dynamics (4) ISE 350: (3) ISE 500: Intro to ISE (3) ISE 504: Engineering Economics (3)
AU12 (First Semester as ISE Major)	SP 13	
ISE 2400: Design of Work (1.5) ISE 3200: Opt. for Enterprise Systems (3) ISE 3400: Production Planning (3) ISE 3600: Workplace Ergonomics (3) ECE 2300: Electrical Circuits & Electronic Devices (3)	ISE 3210: Opt. for System Design (3) ISE 3410: Facilities Planning (3) ISE 3700: Cog. Systems Engineering (3) ISE 4120: Quality Control and Imp. (3)	
AU13	SP14	
MSE 2010: Intro to Eng. Materials (3) ISE 3800: Engineering Project Management (2) ISE 5310: Discrete Event Simulation (3) Technical Elective (1) Gen Ed (3)	ISE 4900: Capstone Design (4) ISE 4500: Manufacturing Process Eng (3) Technical Elective (3) ISE 5110: Des. Eng. Experiments (3)	

General Education	Course Number	QCH	Class Taken	QCH	Sem Taken	SCH	QCH Differential (Taken - Required)	Reallocated QCH	Net Change in QCH	Notes / Resolution
GEC	English 110	5	English 110	5						
GEC	Psych 100	5	Psych 100	5						
GEC	Econ 200	5	Econ 200	5						
GEC	2nd Writing GEC	5	2nd Writing GEC	5						
GEC	GEC	5	GEC1	5						
GEC	GEC	5	GEC2	5						
GEC	GEC	5	Gen Ed		AU13	3				
Total General Education Course Number		35		30		3	-0.50		-0.50	T1: Tech Elective
Engineering Core	Course Number	QCH								
Math	Math 151	5	Math 151	5						
	Math 152	5	Math 152	5						
	Math 153	5	Math 153	5						
Science	Chem 121	5	Chem 121	5						
	Physics 131	5	Physics 131	5						
	Physics 132	5	Physics 132	5						
	Additional Sci	4	Additional Sci	4						
Computing	CSE 202/205; EG 167	4	CSE 202/205 or EG 167	4						
Engineering Core	Eng 100	1	Eng 100	1						
	Eng 181	3	Eng 181	3						
	Eng 183	3	Eng 181	3						
Total Engineering Core CH		45		45						
ISE Core	Course Number	QCH								
Calc & Analytic Geometry	Math 254	5	Math 254	5						
Differential Equations	Math 255 or 415	5	Math 255 or 415	5						
Linear Algebra	Math 568 or 571	3	Mth 568 or 571	3						
Prob & Stat I	Stat 427	3	Stat 427	3						
Prob & Stat II	Stat 428	3	Stat 428	3						
Statics	ME 410	4	ME 410	4						
Strength of Materials	ME 420	4	ME 420	4						
Dynamics	ME 430	4	ME 430	4						
Intro to MSE	MSE 205	3	MSE 2010		AU13	3	1.50		1.50	
Electrical Circuits	ECE 300 & 309	4	ECE 2300		SP13	3	0.50		0.50	
Accounting	Acct 501	3	Acctg 501	3						
Manufacturing Engineering	ISE 350	3	ISE 350	3						
Introduction to ISE	ISE 500	3	ISE 500	3						
Simulation	ISE 501	5	ISE 5310		AU 13	3	-0.50		-0.50	
Engineering Economics	ISE 504	3	ISE 504	3						
Statistical Process Control	ISE 510	3	ISE 4120		SP 13	3	1.50		1.50	
Linear Optimization	ISE 520	3	ISE 3200		AU 12	3	1.50		1.50	
Nonlinear Optimization	ISE 521	3	ISE 3210		SP 13	3	1.50		1.50	
Production Systems Design	ISE 540	4	ISE 2400		AU 12	1.5	-1.75	1.00	-0.75	W1, W2
Facilities Design	ISE 541	4	ISE 3410		SP 13	3	0.50	-0.50		W1: Prod Sys
Production Control	ISE 542	4	ISE 3400		AU 12	3	0.50	-0.50		W2: Prod Sys
Princ Mfg Processes	ISE 550	3	ISE 4500		SP 13	3	1.50		1.50	
Phys Biomech Work Des	ISE 560	3	ISE 3600		AU 12	3	1.50		1.50	
Planning Eng Experiments	ISE 610	3	ISE 5110		SP13	3	1.50		1.50	
Cognitive Engineering	ISE 670	3	ISE 3700		SP 13	3	1.50		1.50	
Capstone Design I & II	ISE 680.01 & 680.02	8	ISE 4900		SP 14	4	-2.00		-2.00	
Project Management	ISE 681	3	ISE 3800		AU 13	2				
Total ISE Core CH		68		43		43.5	40.25		9.25	T2: Tech Elective
Technical Elective	Course Number	QCH								
Technical Elective		3						8.75		T1,T2
Technical Elective		3			AU 13	1				
Technical Elective		3			SP 14	3				
Technical Elective		3								
Technical Elective		3								
Total Technical Elective CH		15				4	-9.00	8.75	-0.25	Final Differential

NFQF AU11(Begin ISE Major in AU13; Graduate in SP15) SEMESTER OPTION

AU 11	WI 12	SP 12
Math 151: (5) Physics 131: (5) Engr 100: (1) Engr 181: (3) GEC (5)	Physics 132: (5) Math 152: (5) Engr 183: (3) GEC (5)	Math 153: (5) CHEM 121 (5) CSE 202/205 or ENG 167: (4) English 110: (5)
AU12		SP 13
ISE 2040: Engineering Economics (2) MATH 2173: Engineering Mathematics (3) STAT 3470: Probability and Statistics (3) ME 2040: Statics and Strength of Materials (4) 2 nd Writing GEC (3) Gen Ed (3)		ISE 2000: Intro to ISE (1.5) ISE 2010: Systems Modeling (3) ISE 2400: Design of Work (1.5) ISE 2500: Manufacturing Eng (3) Math 2174: Linear Algebra & Differential Equations (3) Engineering Science (3)
AU13 (First Semester as ISE Major)		SP 14
ISE 3200: Opt. for Enterprise Systems (3) ISE 3300: Prob. Models for Planning (3) ISE 3400: Production Planning (3) ISE 3600: Workplace Ergonomics (3) Gen Ed (3)		ISE 3210: Opt. for System Design (3) ISE 3410: Facilities Planning (3) ISE 3700: Cog. Systems Engineering (3) ISE 4120: Quality Control and Imp. (3) Gen Ed (3)
AU14		SP 15
ISE 3800: Project Management (2) ISE 3810: Implementation & Change Mgmt (1) ISE 5310: Discrete Event Simulation (3) Technical Elective (3) Technical Elective (3) Gen Ed (3)		ISE 4900: Capstone Design (4) Technical Elective (3) Technical Elective (3) Gen Ed (3)

General Education	Course Number	SCH	Class Taken	QCH	Sem Taken	SCH	SCH Differential	Reallocated SCH	Net Change in SCH	Notes / Resolution
Gen Ed 1	GEC1	3		5					0.00	
Gen Ed 2	GEC2	3		5					0.00	
Gen Ed 3	Gen Ed (Sem.)	3			AU12	3			0.00	
Gen Ed 4	Gen Ed (Sem.)	3			AU13	3			0.00	
Gen Ed 5	Gen Ed (Sem.)	3			SP14	3			0.00	
Gen Ed 6	Gen Ed (Sem.)	3			AU14	3			0.00	
Gen Ed 7	Gen Ed (Sem.)	3			SP15	3			0.00	
English 1100	English 110	3		5					0.00	
Total General Education Course Number		24		15		15	1.00		1.00	T1: Tech Elective
Engineering Core		SCH								
Eng Survey	ENG 100	1		1					0.00	
Intro Engineering I	ENG 181	2		3					-0.33	
Intro Engineering II	ENG 182	2		3					0.00	
Engineering Calculus I	Math 1151	5							0.00	
Engineering Calculus II	Math 1172	5	Math 151, 152, 153	15					0.00	
Physics I	Physics 1151	5	Phys 131,132	10					0.00	
Total Engineering Core CH		20		32		0		-1.00	0.67	A: Add'l Science
ISE Core		SCH								T2: Tech Elective
Additional science	Chem 121	4		5					0.00	
Additional Science	Additional Sci	3		4					-0.67	A1: from A
Engineering science	CSE 205 / ENG 167	3			SP13	4			0.00	A2: from A
Computer Programming	Math 2173	3		4					0.00	B1, B2, B3
Differential Equations	Math 2174	3		5	AU12	3			-0.33	
Linear Algebra	ME 2040	4		8	AU12	3			0.33	
Statics/Strength of Mat.	Stat 3470	3		6	AU12	3			-1.00	
Probability and Statistic	ISE 2000	1.5		3	SP13	3			0.00	B1: Eng Science
Intro to ISE: 1/2 Sem.	ISE 2010	3		5	SP13	3			1.00	
Systems Modeling	ISE 2040	2		3	AU12	3			0.50	B2: Eng Science
Engineering Economics	ISE 2400	1.5		2	SP13	3			0.33	
Design of Work: 1/2 Sem.	ISE 2500	3		3	SP13	3			0.00	
Intro to Manufacturing Eng	ISE 3200	3		3	AU13	3			-0.17	B3: Eng Science
Opt. for Enterprise Systems	ISE 3210	3			SP14	3			-1.00	
Opt. for System Design	ISE 3300	3			AU13	3			0.00	
Prob. Models for Planning	ISE 3400	3			AU13	3			0.00	
Production Planning	ISE 3410	3			SP14	3			0.00	
Facilities Planning	ISE 3600	3			AU13	3			0.00	
Workplace Ergonomics	ISE 3700	3			SP14	3			0.00	
Cog. Systems Engineering	ISE 3800	2			AU14	2			0.00	
Eng. Project Management	ISE 3810	1			AU14	1			0.00	
Implementation & Change Mgmt	ISE 4120	3			SP14	3			0.00	
Quality Control & Improvement	ISE 4900	4			SP15	4			0.00	
Capstone Design	ISE 5310	3			AU14	3			0.00	
Discrete Event Simulation		3				34			0.00	
Total ISE Core CH		71		51		0			-2.00	T3: Tech Elective
Technical Elective		SCH								
Technical Elective		3			AU14	3			0.00	
Technical Elective		3			AU14	3			0.00	
Technical Elective		3			SP15	3			0.00	
Technical Elective		3			SP15	3			0.00	
Total Technical Elective CH		12		0		12	0.00	-0.67	-0.67	T1+T2+T3
										Final Differential