New Proposal

Date Submitted: 11/17/23 1:34 pm

Viewing: **: Agricultural & Biological Engineering: Sustainable Ecological and Environmental Systems Engineering, BS**

Last edit: 03/28/24 8:59 am

Changes proposed by: Kent Rausch

In Workflow

1. **U Program Review**
2. **1227 Head**
3. **1741 Committee Chair**
4. **1741 Head**
5. **KL Committee Chair**
6. **KL Dean**
7. **KP Committee Chair**
8. **KP Dean**
9. **University Librarian**
10. **COTE Programs**
11. **Provost**
12. **Senate EPC**
13. Senate
14. U Senate Conf
15. Board of Trustees
16. IBHE
17. HLC
18. DMI

Approval Path

1. 11/28/23 2:17 pm
   Donna Butler (dbutler):
   Approved for U Program Review
2. 12/12/23 10:40 am
   Ashley Hallock (ahallock):
   Approved for 1227 Head
3. 12/12/23 11:14 am
   Kent Rausch (krausch):
   Approved for 1741 Committee Chair

4. 12/12/23 8:30 pm
   Ronaldo Maghirang (ronaldom): Approved for 1741 Head
5. 12/13/23 11:36 am
   Brianna Gregg (bjgray2): Approved for KL Committee Chair
6. 12/13/23 11:56 am
   Anna Ball (aball): Approved for KL Dean
7. 03/08/24 8:58 am
   Ashley Hallock (ahallock): Approved for KP Committee Chair
8. 03/08/24 8:59 am
   Michael Stoller (stoller4): Approved for KP Dean
9. 03/18/24 10:23 am
   Claire Stewart (clairest): Approved for University Librarian
10. 03/18/24 10:43 am
    Suzanne Lee (suzannel): Approved for COTE Programs
11. 03/21/24 10:39 am
    Brooke Newell (bsnewell): Approved for Provost

Proposal Type

Proposal Type:
Concentration (ex. Dietetics)

Administration Details

Official Program Name	Agricultural & Biological Engineering: Sustainable Ecological and Environmental Systems Engineering, BS
Diploma Title	Bachelor of Science in Agricultural and Biological Engineering
Sponsor College	Grainger College of Engineering
Sponsor Department	Engineering Administration
Sponsor Name	Ronaldo Maghirang, Kent Rausch
Sponsor Email	ronaldom@illinois.edu, krausch@illinois.edu
College Contact	Ashley Hallock
College Contact Email	ahallock@illinois.edu
College Budget Officer	Tessa Hile
College Budget Officer Email	tmhile@illinois.edu

List the role for rollbacks (which role will edit the proposal on questions from EPC, e.g., Dept Head or Initiator) and/or any additional stakeholders. Purpose: List here who will do the editing work if proposal needs rolled back. And any other stakeholders.

Ashley Hallock, ahallock@illinois.edu; Ronaldo Maghirang, ronaldom@illinois.edu (ABE head); Kent Rausch, krausch@illinois.edu (ABE C&C)

Does this program have inter-departmental administration?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

Please describe the oversight/governance for this program, e.g., traditional departmental/college governance. Inclusion of/roles of elected faculty committees? Inclusion of/roles of any advisory committees.

Agricultural & Biological Engineering (ABE) programs are governed through a Courses and Curricula committee consisting of ABE faculty and ex officio officers. ABE students graduate through the Grainger College of Engineering. Curricula changes are reviewed by the Grainger College of Engineering as well as the College of ACES. As an engineering curriculum, the ABE degree programs are reviewed and accredited by the Accreditation Board for Engineering and Technology (ABET).

College	Agr, Consumer & Env Sciences
Department	Agricultural & Biological Engr

Is there an additional department involved in governance?

No

Proposal Title

Effective Catalog Term: Fall 2024

Proposal Title (either Establish/Revise/Eliminate the Degree Name in Program Name in the College of XXXX, i.e., Establish the Bachelor of Science in Entomology in the College of Liberals Art and Sciences, include the Graduate College for Grad Programs)

Establish a Concentration in Sustainable Ecological and Environmental Systems Engineering in the Bachelor of Science in Agricultural and Biological Engineering in the Grainger College of Engineering

Does this proposal have any related proposals that will also be revised during the next 6 weeks? Consider Majors, Minors, Concentrations & Joint Programs in your department. Please know that this information is used administratively to move related proposals through workflow efficiently. Example: If you are revising the BS proposal and one related concentration within the next 6 weeks, "This BS proposal (key 567) is related to the Concentration A proposal (key 145)."

As part of the revision to the ABE BS (key 507) six concentrations are proposed, replacing the two existing concentrations (Agricultural, Biological).
1. Off-Highway Vehicle and Equipment Engineering, key 1174
2. Soil and Water Resources Engineering, key 1175
3. Bioprocess Engineering and Industrial Biotechnology, key 1176
4. Sustainable Ecological and Environmental Systems Engineering, key 1177
5. Renewable Energy Systems Engineering, key 1178
6. Synthetic Biological Engineering, key 1179

The 10KL5163BSAG: Agricultural & Biological Engineering, BSAG program is not changed (key 72), with only minor updates. The Agricultural Engineering and Biological Engineering concentrations within the ABE BS (keys 732 and 733, respectively) are being phased down.

Program Justification

Provide a brief justification of the program, including highlights of the program objectives, and the careers, occupations, or further educational opportunities for which the program will prepare graduates, when appropriate.

Revisions to the Agricultural and Biological Engineering (ABE) major will provide more cohesive progression of introductory fundamental ABE courses during years 1 and 2, followed by distinctive concentrations in focused career fields. The concentrations will communicate to potential students and employers the capabilities of students graduating from the ABE major with one of the concentrations.

The revised ABE BS base will refine the curriculum to include a four semester common core, followed by four semesters within a student's chosen concentration. Each concentration has 30 credit hours required.

The Sustainable Ecological and Environmental Systems Engineering (SEESE) concentration defines a unique area of expertise within the ABE discipline, providing training to students in fundamental areas of engineering and applying them to natural and manmade systems involving humans, plants and animals. The concentration has a foundation of 19-21 hours of upper level engineering plus 16-18 hr course work related to natural ecosystems, plant production or animal production.

A total of 52 hours upper-division for the degree
• 300 & 400 level classes
o 22 hours concentration elective courses, minimum
• ABE 341 (3 hours)
• ABE 425 (4 hours)
• TAM 335 (4 hours)
• CEE 330 (3 hours)
• ABE 450, ABE 451, ABE 452, or ABE 456 (3 hours)
• ABE 436, ABE 457, ABE 458, ABE 459, ABE 476, CEE 434, or CEE 440 (2 hours)
• 'Select two courses from one of the following sets' list. Since there is 100/200 level course in each set, only accounting for 1 course at the 300/400 level (3 hours)
o 12 hours from the ABE BS Core
• ABE 340 (3 hours)
• ABE 430 (2 hours)
• ABE 469 (4 hours)
• IE 300 or STAT 400 (3 hours)
• 18 hours 200 level coursework with 2 or more prerequisites
o ECE 205 (3 hours) - prerequisite of PHYS 212 and MATH 241 and PHYS 211
o PHYS 211 (4 hours) - prerequisites of MATH 231 and MATH 220 or 221
o PHYS 212 (4 hours) - prerequisites of MATH 241 and PHYS 211
o MATH 241 (4 hours) - prerequisites of MATH 231 and MATH 220 or 221
o TAM 211 (3 hours) - prerequisites of PHYS 211, MATH 241 or 257

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does this new program/proposed change result in the replacement of another program?

No

Does the program include other courses/subjects outside of the sponsoring department impacted by the creation/revision of this program?

Yes

Courses outside of the sponsoring department/interdisciplinary departments

TAM 335 - Introductory Fluid Mechanics
CEE 330 - Environmental Engineering
IB 150 - Organismal & Evolutionary Biol
CEE 434 - Environmental Systems I
CEE 440 - Fate Cleanup Environ Pollutant
IB 452 - Ecosystem Ecology
NRES 219 - Applied Ecology
NRES 348 - Fish and Wildlife Ecology
NRES 362 - Ecology of Invasive Species
NRES 418 - Wetland Ecology & Management
NRES 419 - Env and Plant Ecosystems
NRES 420 - Restoration Ecology
NRES 429 - Aquatic Ecosystem Conservation
NRES 439 - Env and Sustainable Dev
NRES 485 - Stream Ecosystem Management
HORT 100 - Introduction to Horticulture
HORT 341 - Greenhouse Mgmt and Production
HORT 435 - Urban Food Production
ANSC 100 - Intro to Animal Sciences
ANSC 363 - Behavior of Domestic Animals
IB 329 - Animal Behavior

Please attach any letters of support/acknowledgement for any Instructional Resources consider faculty, students, and/or other impacted units as appropriate.

TAM.pdf
HORT.pdf
IB.pdf
NRES.pdf
ANSC.pdf
CEE updated.pdf

Program Regulation and Assessment

Plan to Assess and Improve Student Learning

Illinois Administrative Code: 1050.30(b)(1)(D) Provision is made for guidance and counseling of students, evaluations of student performance, continuous monitoring of progress of students toward their degree objectives and appropriate academic record keeping.

List the program's student learning outcomes. Each outcome should identify what students are expected to know and/or be able to do upon completing this program.

Student outcomes for the program are:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

3. an ability to communicate effectively with a range of audiences.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Describe how, when, and where these learning outcomes will be assessed.

Describe here:

The process of periodical reviews is a continuous improvement process. The ABE Course and Curriculum Committee and the ABE Faculty Advisory Committee work with the department administration to maintain and revise the program educational objectives. The ABE Outcomes and Assessment Committee manages the processes of the development, collection and summarization of the program education objectives review data collection.

Student senior exit interviews are conducted by the Head. A written senior exit survey questionnaire is provided to each graduating senior at the end of the last semester of enrollment. All graduating seniors are asked to participate in a focus group to discuss the nature of their undergraduate experience. Participation in the senior exit interviews and the completion of the written senior exit questionnaire are voluntary. The information provided by the senior exit interview and questionnaires are compiled by the ABE Undergraduate Program Coordinator. The summary information is provided to the ABE Administration, the ABE Faculty Advisory Committee and the ABE Course and Curriculum Committee. The information is used to review the program educational objectives.

Alumni surveys also are used. ABE alumni are surveyed after graduation at 2, 5 and 10 year intervals post-graduation. A survey form is sent to each available alumnus via electronic media. Completed forms are compiled in a summary format. The information is available to the ABE faculty, administration and Courses and Curriculum Committee for reviewing the objectives.

Feedback from employers is provided by the ABE External Advisory Committee and companies representatives that work with the senior design team projects. The ABE External Advisory Committee meets on an annual basis with ABE administration, students, faculty and staff. The Committee provides feedback relative to PEOs as part of a committee report. This report is provided to faculty, administration and staff as a written report and a discussion presentation. Companies sponsor the ABE senior industry linked design projects, and representatives from these companies provide feedback to students and faculty about students' preparedness upon completion of the projects. This information is considered very useful in assessing and reviewing the program educational objectives.

Alumni surveys also are used to assess involvement of ABE graduates in the ABE profession. Participation in professional meetings and conferences is not formally assessed, but efforts are made on behalf of the ABE department to connect with graduates in professional activities through departmental sponsored receptions at annual ASBAE International Meetings, local ASABE section meetings, the Grainger College of Engineering annual open house, College of ACES annual ExplorACES open house, an annual ABE@Illinois on-campus event for all alumni and annual homecoming activities in conjunction with university events. These activities are not formally assessed, but they are discussed by the ABE department relative to our program quality and program educational objectives.

Identify faculty expectations for students' achievement of each of the stated student learning outcomes. What score, rating, or level of expertise will signify that students have met each outcome? Provide rating rubrics as necessary.

This concentration is subject to the ABET accreditation process which assesses each learning outcome as well as the entire ABE BS program. Please refer to the ABE BS program for details on outcomes assessment.

Explain the process that will be implemented to ensure that assessment results are used to improve student learning.

The SEESE concentration will be assessed as a part of the overall ABE BS program according to standards and methods used by the Engineering Accreditation Commission of ABET, Inc. (abet.org). This accreditation process uses data collected during BS degree completion and post graduation to determine the extent that student learning outcomes were achieved and where improvement may be needed. Student assignments, exit interviews and feedback from alumni and employers are used for improving the program. The ABE Courses and Curriculum Committee and other select faculty preparing for ABET review will collect feedback regarding the BEIB concentration and ensure that courses map to the student outcomes and meet learning outcomes. Areas in need of improvement will be identified and recommendations for improvement will be specified that can be implemented in future years. The systematic assessment of student outcomes will be used to track progress and improvement goals.

Program Description and Requirements Attach Documents

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PublicAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

Attach Program of Study-related information such as sample sequences (for undergraduate programs) or college-level forms.	ABE curriculum revisions side by side 20231117.xlsx ABE Curriculum 2023 Sample Sequences 20231117.xlsx

Catalog Page Text - Overview Tab

Description of program for the catalog page. This is not official content, it is used to help build the new catalog page for the program. Can be edited in the catalog by the college or department.

Statement for Programs of Study Catalog

Graduation Requirements

Minimum Overall GPA: 2.0

Minimum hours required for graduation: 128 hours, to include a minimum of 40 hours of upper-division coursework generally at the 300 and/or 400 level. These hours can be drawn from all elements of the degree.

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. One of the Social and Behavioral Sciences (SBS) courses must include one of the following economics courses: ECON 102, ACE 100, ACE 210, ACE 251 or ACE 255. ABE 469 will satisfy a technical core course and the Campus General Education Advanced Composition requirement.

Orientation and Professional Development

Course List

Code	Title	Hours
ABE 127	Introduction to Agricultural & Biological Engineering	2
ENG 100	Grainger Engineering Orientation Seminar (External transfer students take ENG 300.)	1
Total Hours		3

Foundational Mathematics and Science

Course List

Code	Title	Hours
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
MATH 221	Calculus I (MATH 220 may be substituted. MATH 220 is appropriate for students with no background in calculus. 4 of 5 credit hours count towards degree.)	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications	3
MATH 285	Intro Differential Equations	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
Total Hours		33

Agricultural and Biological Engineering Technical Core

Course List

Code	Title	Hours
ABE 128	Applied Biology for Agricultural and Biological Engineers	3
ABE 227	Computer-Aided Problem-Solving for ABE I	3
ABE 228	Computer-Aided Problem-Solving for ABE II	3
ABE 340	Thermodynamics for Agricultural and Biological Engineering	3
ABE 430	Project Management	2
ABE 469	Capstone Design Experience	4
CS 101	Intro Computing: Engrg & Sci	3
ECE 205	Electrical and Electronic Circuits	3

Code	Title	Hours
SE 101	Engineering Graphics & Design	3
IE 300	Analysis of Data	3
or STAT 400	Statistics and Probability I	
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
Total Hours		36

Concentration Requirements: complete a minimum of 30 hours from courses below

Course List

Code	Title	Hours
Required courses		
ABE 341	Transport Processes in ABE	3
ABE 425	Engrg Measurement Systems	4
TAM 335	Introductory Fluid Mechanics	4
CEE 330	Environmental Engineering	3
IB 150	Organismal & Evolutionary Biol	4
Total Hours		18

Course List

Code	Title	Hours
Select one of the following:		
ABE 450	International Water Project I	3
ABE 451	International Water Project II	3
ABE 452	Engineering for Disaster Resilience	3
ABE 456	Land & Water Resources Engrg	3

Course List

Code	Title	Hours
Select one of the following:		
ABE 436	Renewable Energy Systems	3
ABE 457	NPS Pollution Processes	2
ABE 458	NPS Pollution Modeling	2
ABE 459	Drainage and Water Management	4
ABE 476	Indoor Air Quality Engineering	4
CEE 434	Environmental Systems I	3
CEE 440	Fate Cleanup Environ Pollutant	4

Course List

Code	Title	Hours
Select at least two courses from one of the following sets (Ecological, Horticultural or Animal):		
Ecological Systems		
IB 452	Ecosystem Ecology	3
NRES 219	Applied Ecology	3
NRES 348	Fish and Wildlife Ecology	3
NRES 362	Ecology of Invasive Species	3
NRES 418	Wetland Ecology & Management	3
NRES 419	Env and Plant Ecosystems	3
NRES 420	Restoration Ecology	4
NRES 429	Aquatic Ecosystem Conservation	3
NRES 439	Env and Sustainable Dev	3
NRES 485	Stream Ecosystem Management	4

Course List		
Code	Title	Hours
OR		
Horticultural Systems		
HORT 100	Introduction to Horticulture	3
HORT 341	Greenhouse Mgmt and Production	4
HORT 435	Urban Food Production	3

Course List		
Code	Title	Hours
OR		
Animal Systems		
ANSC 100	Intro to Animal Sciences	4
ANSC 363	Behavior of Domestic Animals	4
IB 329	Animal Behavior	3

Course List		
Code	Title	Hours
Total Minimum Concentration Hours		30

Course List		
Code	Title	Hours
Free Electives		10
Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree.		
Total Hours of Curriculum to Graduate		128

Program Relationships

Corresponding Program(s):

Corresponding Program(s)
Agricultural & Biological Engineering, BS

Program Features

Academic Level: Undergraduate

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Additional concentration notes (e.g., estimated enrollment, advising plans, etc.)

Delivery Method

This program is

available:
On Campus - Students are required to be on campus, they may take some online courses.

Number of Students in Program (estimate)

Year One Estimate	10	5th Year Estimate (or when fully implemented)	30

Budget

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?
No

Additional Budget Information

Attach File(s)

Financial Resources

How does the unit intend to financially support this proposal?
This concentration requires no additional financial resources as it will build upon current courses offered. No additional faculty will be needed to support the concentration as proposed.

Will the unit need to seek campus or other external resources?
No

Attach letters of support

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc.

No major changes are anticipated in class sizes, although enrollments in some required courses may increase slightly.

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Courses specified in the proposed Concentration already exist. Therefore, new or increased Library resources will not be needed. Existing Library collections, resources and services are sufficient to support this program.

HLC Section

Credit Hours

Existing or repackaged curricula (Courses from existing inventory of courses):	Number of Credit Hours: 91	117 Percent of Total:
Revised or redesigned curricula (Courses for which content has been revised for the new program):	Number of Credit Hours: 9	11 Percent of Total:
New curricula (Courses developed for the new program that have never been offered):	Number of Credit Hours: 0	0 Percent of Total:
Total Credit Hours of the Program:	Number of Credit Hours:	128 Percent of Total:

100

New Faculty Required

Will new faculty expertise or new faculty members be needed to launch this program?

No

Please explain existing coverage:

Courses taught within the department for this Concentration are already being offered by existing faculty. All courses listed in the Concentration have room for modest increases in enrollment.

Additional Funds

Will the proposed program require a large outlay of additional funds by the institution?

No

Institutional Funding

Please explain institutional funding for proposed program:

No additional institutional funding will be needed.

EP Documentation

EP Control Number	EP.24.105
Attach Rollback/Approval Notices	

This proposal requires HLC inquiry	No

DMI Documentation

Attach Final Approval Notices	
Banner/Codebook Name	
Program Code:	

Minor Code	Conc Code	Degree Code	Major Code

Senate Approval Date	
Senate Conference Approval Date	
BOT Approval Date	
IBHE Approval Date	
HLC Approval Date	
DOE Approval Date	
Effective Date:	
Attached Document Justification for this request	

Program Reviewer Comments	**Brooke Newell (bsnewell) (03/10/23 11:39 am):** Rollback: Email sent to Kent, Mike, Ashley, and Ronaldo **Brooke Newell (bsnewell) (04/24/23 9:30 am):** Rollback: Revisions requested to Admin Details, Instructional Resources, Program Justification, POS table, and Corresponding Programs. Detailed email sent to Ashley, Kent, Ronaldo, and Brianna **Brooke Newell (bsnewell) (09/11/23 12:17 pm):** Rollback: email sent to Kent, Ashley, and Ronaldo **Brooke Newell (bsnewell) (11/01/23 3:21 pm):** Rollback: Email sent to Kent, Ashley, Brianna and Ronaldo

From: Jacobi, Anthony M
To: Crump, Heather Michelle
Cc: Rausch, Kent D
Subject: RE: ABE - New Concentrations
Date: Wednesday, April 12, 2023 7:48:08 AM
Attachments: image002.png
image003.png
image004.png

Dear Heather,

I apologize for the delay—I thought I'd already responded.

Yes, MechSE is supportive and can accommodate these new concentrations.

Regards,
Tony

ILLINOIS
Anthony M. Jacobi
Head, Mechanical Science and Engineering
Richard W. Kritzer Distinguished Professor
University of Illinois at Urbana-Champaign
1206 W. Green Street / Urbana, IL 61801
217-333-4108

From: Crump, Heather Michelle <hcrump@illinois.edu>
Sent: Wednesday, April 12, 2023 12:53 AM
To: Jacobi, Anthony M <a-jacobi@illinois.edu>
Cc: Rausch, Kent D <krausch@illinois.edu>
Subject: ABE - New Concentrations

Dr. Jacobi,

I am following up on the below email regarding the new concentrations in ABE. As part of one or more of these concentrations, we are proposing to specify one or more of your courses as part of the Program of Study.

At your convenience, could you please confirm if we have support from TAM? We need these letters before we can move our proposals forward.

Please let us know if you have any questions.

Thank you in advance,

HEATHER CRUMP
Administrative Aide

Schedule for Spring 2023: Office (332K) – Monday, Tuesday, Wednesday; Remote – Thursday, Friday
Department of Agricultural and Biological Engineering
College of Agricultural, Consumer and Environmental Sciences Administration
University of Illinois at Urbana-Champaign
Agricultural & Biological Engineering
332K AESB | M/C 644
Urbana, IL 61801
217.333.2446 | hcrump@illinois.edu
abe.illinois.edu

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From: Crump, Heather Michelle
Sent: Monday, April 3, 2023 3:56 PM
To: Jacobi, Anthony M <a-jacobi@illinois.edu>
Subject: ABE - New Concentrations

Dear Dr. Jacobi,

The Agricultural and Biological Engineering (ABE) department is revising its BS program and creating six new concentrations:

BEIB	Bioprocess Engineering and Industrial Biotechnology
OHVEE	Off-Highway Vehicle and Equipment Engineering
RESE	Renewable Energy Systems Engineering
SWRE	Soil and Water Resources Engineering
SEESE	Sustainable Ecosystems and Environmental Systems Engineering
SBE	Synthetic Biological Engineering

As part of one or more of these concentrations, we are proposing to specify one or more of your courses as part of the Program of Study. We anticipate about 10-15 students in the ABE BS program to take these courses each year. In some cases, our ABE students have been enrolling in your courses as part of a more general program of study. For your department, the courses listed are:

TAM 251	Introductory Solid Mechanics	OHVEE
TAM 251	Introductory Solid Mechanics	RESE
TAM 335	Introductory Fluid Mechanics	OHVEE
TAM 335	Introductory Fluid Mechanics	RESE
TAM 335	Introductory Fluid Mechanics	SWRE
TAM 335	Introductory Fluid Mechanics	SEESE

Please let me know if you have any questions. Thank you.

Dr. Kent Rausch
Chair, ABE Courses and Curriculum committee

HEATHER CRUMP
Administrative Aide
Schedule for Fall 2022: Office (332K) – Monday, Tuesday, Wednesday; Remote – Thursday, Friday
Department of Agricultural and Biological Engineering
College of Agricultural, Consumer and Environmental Sciences Administration
University of Illinois at Urbana-Champaign
Agricultural & Biological Engineering
332K AESB | M/C 644
Urbana, IL 61801
217.333.2446 | hcrump@illinois.edu
abe.illinois.edu

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From: Davis, Adam
To: Crump, Heather Michelle
Subject: RE: ABE - New Concentrations
Date: Wednesday, April 5, 2023 3:16:24 PM
Attachments: image002.png
image001.png

Thanks for checking in about this. The proposed additional enrollment in these courses would be welcome.

Regards,

Adam

ADAM DAVIS

Professor & Head

University of Illinois at Urbana-Champaign
College of Agricultural, Consumer and Environmental Sciences
Department of Crop Sciences
AW-115 Turner Hall | M/C 046
Urbana, IL 61801
217.333.9654 | asdavis1@illinois.edu
cropsciences.illinois.edu
Pronouns |(he/him)

From: Crump, Heather Michelle <hcrump@illinois.edu>
Sent: Monday, April 3, 2023 3:26 PM
To: Davis, Adam <asdavis1@illinois.edu>
Subject: ABE - New Concentrations

Dr. Davis,

The Agricultural and Biological Engineering (ABE) department is revising its BS program and creating six new concentrations:

BEIB	Bioprocess Engineering and Industrial Biotechnology
OHVEE	Off-Highway Vehicle and Equipment Engineering
RESE	Renewable Energy Systems Engineering
SWRE	Soil and Water Resources Engineering

SEESE	Sustainable Ecosystems and Environmental Systems Engineering
SBE	Synthetic Biological Engineering

As part of one or more of these concentrations, we are proposing to specify one or more of your courses as part of the Program of Study. We anticipate about 10-15 students in the ABE BS program to take these courses each year. In some cases, our ABE students have been enrolling in your courses as part of a more general program of study. For your department, the courses listed are:

HORT 100	Introduction to Horticulture	SEESE
HORT 341	Greenhouse Mgmt and Production	SEESE
HORT 435	Urban Food Production	SEESE

Please let me know if you have any questions. Thank you.

Dr. Kent Rausch
Chair, ABE Courses and Curriculum committee

HEATHER CRUMP
Administrative Aide
Schedule for Fall 2022: Office (332K) – Monday, Tuesday, Wednesday; Remote – Thursday, Friday
Department of Agricultural and Biological Engineering
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University of Illinois at Urbana-Champaign
Agricultural & Biological Engineering
332K AESB | M/C 644
Urbana, IL 61801
217.333.2446 | hcrump@illinois.edu
abe.illinois.edu

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From: Caceres, Carla E
To: Crump, Heather Michelle
Cc: O"Dwyer, Allison; Allan, Brian F
Subject: RE: ABE - New Concentrations
Date: Monday, April 3, 2023 5:46:24 PM
Attachments: image001.png

Thank you for letting us know. This shouldn't be a problem.
Best wishes,
Carla

From: Crump, Heather Michelle <hcrump@illinois.edu>
Sent: Monday, April 3, 2023 3:30 PM
To: Caceres, Carla E <cecacere@illinois.edu>
Subject: ABE - New Concentrations

Dear Dr. Caceres,

The Agricultural and Biological Engineering (ABE) department is revising its BS program and creating six new concentrations:

BEIB	Bioprocess Engineering and Industrial Biotechnology
OHVEE	Off-Highway Vehicle and Equipment Engineering
RESE	Renewable Energy Systems Engineering
SWRE	Soil and Water Resources Engineering
SEESE	Sustainable Ecosystems and Environmental Systems Engineering
SBE	Synthetic Biological Engineering

As part of one or more of these concentrations, we are proposing to specify one or more of your courses as part of the Program of Study. We anticipate about 10-15 students in the ABE BS program to take these courses each year. In some cases, our ABE students have been enrolling in your courses as part of a more general program of study. For your department, the courses listed are:

IB 103	Introduction to Plant Biology	SBE
IB 104	Animal Biology	SBE
IB 150	Organismal & Evolutionary Biol	SEESE
IB 150	Organismal & Evolutionary Biol	SBE
IB 204	Genetics	SBE
IB 329	Animal Behavior	SEESE
IB 411	Bioinspiration	SBE
IB 420	Plant Physiology	SBE
IB 421	Photosynthesis	SBE
IB 432	Genes and Behavior	SBE
IB 452	Ecosystem Ecology	SEESE
IB 472	Plant Molecular Biology	SBE
IB 473	Plant Genomics	SBE

Please let me know if you have any questions. Thank you.

Dr. Kent Rausch

Chair, ABE Courses and Curriculum committee

HEATHER CRUMP
Administrative Aide
Schedule for Fall 2022: Office (332K) – Monday, Tuesday, Wednesday; Remote – Thursday, Friday
Department of Agricultural and Biological Engineering
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Urbana, IL 61801
217.333.2446 | hcrump@illinois.edu
abe.illinois.edu

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From: Schooley, Robert Lee
To: Crump, Heather Michelle
Subject: RE: ABE - New Concentrations
Date: Wednesday, April 12, 2023 1:25:56 PM
Attachments: image002.png
image003.png
image004.png

Dear Heather,

NRES supports the inclusion of the courses that you have listed for the revised BS program in Agricultural and Biological Engineering. I will note that NRES 439, Environmental and Sustainable Development, is currently only taught online and not in-person.

All the best with your curriculum revision.

Bob

ROBERT L. SCHOOLEY
Professor and Head

Department of Natural Resources and Environmental Sciences
College of Agricultural, Consumer and Environmental Sciences
University of Illinois Urbana-Champaign
W-503 Turner Hall | M/C 047
Urbana, IL 61801
217.244.2729 | schooley@illinois.edu
nres.illinois.edu

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

From: Crump, Heather Michelle <hcrump@illinois.edu>
Sent: Wednesday, April 12, 2023 12:52 AM
To: Schooley, Robert Lee <schooley@illinois.edu>
Cc: Rausch, Kent D <krausch@illinois.edu>
Subject: ABE - New Concentrations

Dr. Schooley,

I am following up on the below email regarding the new concentrations in ABE. As part of one or more of these concentrations, we are proposing to specify one or more of your courses as part of the Program of Study.

At your convenience, could you please confirm if we have support from NRES? We need these letters before we can move our proposals forward.

Please let us know if you have any questions.

Thank you in advance,

HEATHER CRUMP
Administrative Aide
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abe.illinois.edu

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---

From: Crump, Heather Michelle
Sent: Monday, April 3, 2023 3:53 PM
To: Schooley, Robert Lee <schooley@illinois.edu>
Subject: ABE - New Concentrations

Dear Dr. Schooley,

The Agricultural and Biological Engineering (ABE) department is revising its BS program and creating six new concentrations:

BEIB	Bioprocess Engineering and Industrial Biotechnology
OHVEE	Off-Highway Vehicle and Equipment Engineering
RESE	Renewable Energy Systems Engineering
SWRE	Soil and Water Resources Engineering
SEESE	Sustainable Ecosystems and Environmental Systems Engineering
SBE	Synthetic Biological Engineering

As part of one or more of these concentrations, we are proposing to specify one or more of your courses as part of the Program of Study. We anticipate about 10-15 students in the ABE BS program to take these courses each year. In some cases, our ABE students have been enrolling in your courses as part of a more general program of study. For your department, the courses listed are:

NRES 201	Introductory Soils	OHVEE	
NRES 201	Introductory Soils	SWRE	
NRES 201	Introductory Soils	SBE	
NRES 219	Applied Ecology	SEESE	
NRES 348	Fish and Wildlife Ecology	SEESE	
NRES 362	Ecology of Invasive Species	SEESE	
NRES 418	Wetland Ecology & Management	SEESE	
NRES 419	Env and Plant Ecosystems	SEESE	
NRES 420	Restoration Ecology	SEESE	
NRES 429	Aquatic Ecosystem Conservation	SEESE	
NRES 439	Env and Sustainable Dev		SEESE
NRES 475	Environmental Microbiology	SWRE	
NRES 475	Environmental Microbiology	SBE	
NRES 485	Stream Ecosystem Management	SEESE	
NRES 488	Soil Fertility and Fertilizers	OHVEE	
NRES 488	Soil Fertility and Fertilizers	SWRE	

Please let me know if you have any questions. Thank you.

Dr. Kent Rausch
Chair, ABE Courses and Curriculum committee

HEATHER CRUMP
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From: Johnson, Rodney W
To: Crump, Heather Michelle
Cc: Rausch, Kent D
Subject: Re: ABE - 6 New Concentrations
Date: Thursday, April 13, 2023 9:25:51 AM
Attachments: image002.png
image004.png

We verified this will have minimum impact on our courses. We approve your proposal.

Sent from my iPhone

> On Apr 12, 2023, at 12:11 AM, Crump, Heather Michelle <hcrump@illinois.edu> wrote:
>
> Dr. Johnson,
>
> I am following up on the below email regarding the new concentrations in ABE. As part of one or more of these concentrations, we are proposing to specify one or more of your courses as part of the Program of Study.
>
> At your convenience, could you please confirm if we have support from ANSC? We need these letters before we can move our proposals forward.
>
> Please let us know if you have any questions.
>
> Thank you in advance,
>
> HEATHER CRUMP
> Administrative Aide
> Schedule for Spring 2023: Office (332K) – Monday, Tuesday, Wednesday; Remote – Thursday, Friday
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> College of Agricultural, Consumer and Environmental Sciences Administration
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> abe.illinois.edu
>
> <image002.png>
>
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>
> **innovation, and engagement**
>
>

public disclosure.

From: Crump, Heather Michelle
Sent: Monday, April 3, 2023 2:07 PM
To: Johnson, Rodney W <rwjohn@illinois.edu>
Subject: ABE - 6 New Concentrations

Dear Dr. Johnson,

The Agricultural and Biological Engineering (ABE) department is revising its BS program and creating six new concentrations:

BEIB	Bioprocess Engineering and Industrial Biotechnology
OHVEE	Off-Highway Vehicle and Equipment Engineering
RESE	Renewable Energy Systems Engineering
SWRE	Soil and Water Resources Engineering
SEESE	Sustainable Ecosystems and Environmental Systems Engineering
SBE	Synthetic Biological Engineering

As part of one or more of these concentrations, we are proposing to specify one or more of your courses as part of the Program of Study. We anticipate about 10-15 students in the ABE BS program to take these courses each year. In some cases, our ABE students have been enrolling in your courses as part of a more general program of study. For your department, the courses listed are:

ANSC 100	Intro to Animal Sciences	SEESE
ANSC 100	Intro to Animal Sciences	SBE
ANSC 221	Cells, Metabolism and Genetics	SBE
ANSC 224	Animal Reproduction and Growth	SBE
ANSC 350	Cellular Metabolism in Animals	SBE
ANSC 363	Behavior of Domestic Animals	SEESE
ANSC 431	Advanced Reproductive Biology	SBE
ANSC 446	Population Genetics	SBE

Please let me know if you have any questions. Thank you.

Kent Rausch
Chair, ABE Courses and Curriculum committee

HEATHER CRUMP
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Urbana, IL 61801

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innovation, and engagement

From: Barros, Ana
To: Crump, Heather Michelle
Cc: Barros, Ana; Popovics, John S; Stillwell, Ashlynn Suzanne
Subject: CEE feedback RE: ABE - Six New Concentrations
Date: Thursday, April 6, 2023 5:26:42 PM
Attachments: image001.png

Dear ABE Colleagues,

CEE can accommodate 10-15students in the classes listed. Our Chair of the Undergraduate Curriculum Committee suggests the following:
"if the RESE concentration is best taking CEE 300 or if CEE 340 would be better. In the past, we had restricted CEE 340 to CEE students only, but not
in recent years. If the advanced composition change goes through for CEE 340, it might fulfill many of the same requirements of CEE 300, aside from
the difference in course hours (3 for CEE 340 vs. 4 for CEE 300)."

If you need further discussion, please contact John Popovics our Associate Head for Undergraduate programs.

Ana Barros

From: Crump, Heather Michelle <hcrump@illinois.edu>
Sent: Monday, April 3, 2023 2:44 PM
To: Barros, Ana <barros@illinois.edu>
Subject: ABE - Six New Concentrations

Dear Dr. Barros,

The Agricultural and Biological Engineering (ABE) department is revising its BS program and creating six new concentrations:

BEIB	Bioprocess Engineering and Industrial Biotechnology
OHVEE	Off-Highway Vehicle and Equipment Engineering
RESE	Renewable Energy Systems Engineering
SWRE	Soil and Water Resources Engineering
SEESE	Sustainable Ecosystems and Environmental Systems Engineering
SBE	Synthetic Biological Engineering

As part of one or more of these concentrations, we are proposing to specify one or more of your courses as part of the Program of Study. We anticipate about 10-15 students in the ABE BS program to take these courses each year. In some cases, our ABE students have been enrolling in your courses as part of a more general program of study. For your department, the courses listed are:

CEE 300	Behavior of Materials	RESE
CEE 330	Environmental Engineering	SWRE
CEE 330	Environmental Engineering	SEESE

CEE 350	Water Resources Engineering	SWRE
CEE 380	Geotechnical Engineering	SWRE
CEE 434	Environmental Systems I	SEESE
CEE 440	Fate Cleanup Environ Pollutant	SEESE
CEE 458	Water Resources Field Methods	SWRE

Please let me know if you have any questions. Thank you.

Dr. Kent Rausch
Chair, ABE Courses and Curriculum committee

HEATHER CRUMP
Administrative Aide
Schedule for Spring 2023: Office (332K) – Monday, Tuesday, Wednesday; Remote – Thursday, Friday
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Fall 2022 Program of Study

Graduation Requirements
Minimum Overall GPA: 2.0

Minimum hours required for graduation: 128 hours

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. One of the SBS courses must be an introductory economics course (ECON 102 or ECON 103 or ACE 100). ABE 469 will satisfy a technical core course and the Campus General Education Advanced Composition requirement.

Orientation and Professional Development

Code	Title	Hours
ABE 100	Intro Agric & Biological Engrg	1
ENG 100	Engineering Orientation (External transfer students take ENG 300)	1
	Total Hours:	2

Foundational Mathematics and Science

Code	Title	Hours
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
MATH 221	Calculus I	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications	3
MATH 285	Intro Differential Equations	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
	Total Hours:	33

Agricultural and Biological Engineering Technical Core

Code	Title	Hours
For Both Concentrations:		
ABE 141	ABE Principles: Biological	2
ABE 223	ABE Principles: Machine Syst	2
ABE 224	ABE Principles: Soil & Water	2
ABE 225	ABE Principles: Bioenvironment	2
ABE 226	ABE Principles: Bioprocessing	2
ABE 430	Project Management	2
ABE 469	Industry-Linked Design Project	4
CS 101	Intro Computing: Engrg & Sci	3
ECE 205	Electrical and Electronic Circuits	3
SE 101	Engineering Graphics & Design	3
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
	Total Hours:	31

Concentration

Students choose one of two concentrations below	**35-36**
Agricultural Engineering	35
Biological Engineering	36

Free Electives

Code	Title	Hours

Proposed Program of Study

Deletion
Change
New course / insertion

Graduation Requirements
Minimum Overall GPA: 2.0

Minimum hours required for graduation: 128 hours

	Hours
General education: Students must complete the Campus General Education requirements including the campus general education language requirement. One of the SBS courses must be an introductory economics course (ECON 102, ACE 100, ACE 210, ACE 251 or, ACE 255). ABE 469 will satisfy a technical core course and the Campus General Education Advanced Composition requirement.	12

Minimum of 40 hours of advanced credit (300 and 400 level) required

Orientation and Professional Development

Code	Title	Hours
ABE 127	Intro Agric & Biological Engrg	2
ENG 100	Engineering Orientation (External transfer students take ENG 300)	1
	Total Hours:	3

Foundational Mathematics and Science

Code	Title	Hours
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
MATH 221	Calculus I	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications	3
MATH 285	Intro Differential Equations	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
	Total Hours:	33

Agricultural and Biological Engineering Technical Core

Code	Title	Hours
ABE 128	Applied Biology for ABEs	3
ABE 227	Computer Aided Problem Solving in ABE I	3
ABE 228	Computer Aided Problem Solving in ABE II	3
ABE 340	Thermodynamics for ABE	3
ABE 430	Project Management	2
ABE 469	Capstone Design Experience	4
CS 101	Intro Computing: Engrg & Sci	3
ECE 205	Electrical and Electronic Circuits	3
SE 101	Engineering Graphics & Design	3
IE 300 or STAT 400	Analysis of Data or Statistics and Probability I	3
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
	Total Hours:	36

Concentrations	Hours
Students are required to complete a <u>minimum</u> of 30 hr credit from one concentration listed below	
Bioprocess Engineering and Industrial Biotechnology	
Off-Highway Vehicle and Equipment Engineering	
Renewable Energy Systems Engineering	
Soil and Water Resources Engineering	
Sustainable Ecological and Environmental Systems Engineering	
Synthetic Biological Engineering	
Total Hours	30

Free Electives

Code	Title	Hours

Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree.	11-12
Total Hours of Curriculum to Graduate	**128**

Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree.	
Total Hours of Curriculum to Graduate	**128**

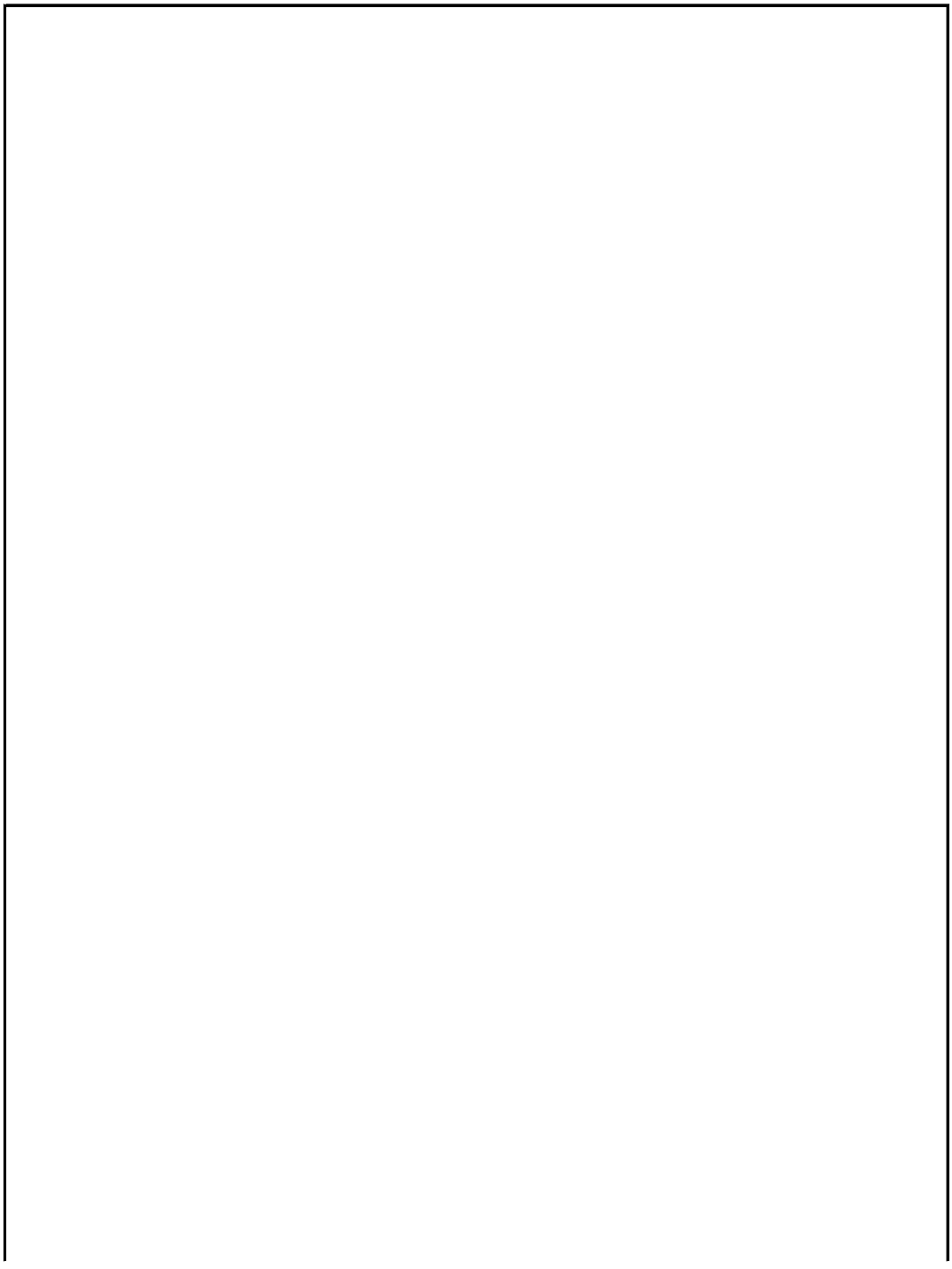
Bioprocess Engineering and Industrial Biotech

Course List

Code	Title	Hours
	Total Required:	**30**
Required courses		**21**
ABE 341	Transport Processes in ABE	3
ABE 425	Eng Measure Systems	4
ABE 483	Engineering Properties of Food Materials	3
ABE 488	Bioprocessing Biomass for Fuel	4
CHEM 232	Organic Chemistry	4
MCB 100	Introductory Microbiology	3

Select 3 hours from the following:		3
FSHN 471	Food and Industrial Microbiology	3
FSHN 481 & 482	Food Processing Unit Operations I (2); Food Proc Unit Op I Lab (1)	3

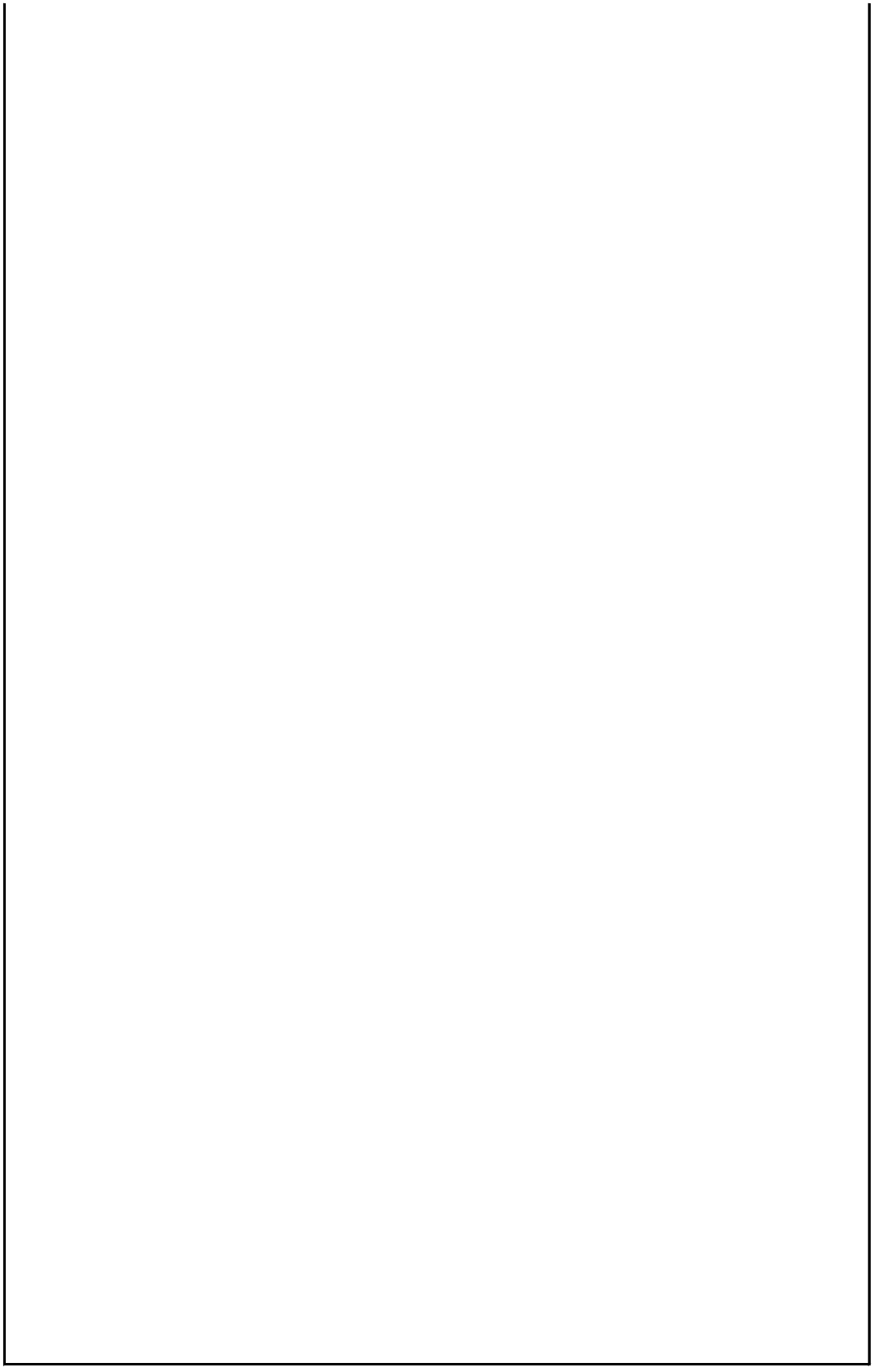
Select 6 hours from the following:		**6**
FSHN 414	Food Chemistry	3
FSHN 472	Applied Food Microbiology	3
FSHN 483 & 484	Food Processing Unit Operations II (2); Food Proc Unit Op II Lab (1)	3
CHBE 471	Biochemical Engineering	3
CHBE 478	Bioenergy Technology	3



Off-Highway Vehicle and Equipment Engineering

Course List

Code	Title	Hours
	Total Required:	**30**
Required courses		**20**
TAM 251	Introductory Solid Mechanics (or ME 330)	3
TAM 335	Introductory Fluid Mechanics	4
ABE 341	Transport Processes in ABE	3
ABE 361	Functional Analysis and Design of Agricultural Machine Syst	3
ABE 425	Eng Measure Systems	4
ABE 466	Engineering Off-Road Vehicles	3
Select one of the following:		**3 to 4**
ABE 426	Principles of Mobile Robotics	4
ABE 454	Soil Physics	3
MSE 280	Engineering Materials	3
Select one of the following sets:		**7**
NRES 201 (4) & NRES 488 (3)	Introductory Soils and Soil Fertility & Fertilizers	7
CPSC 112 (4) & CPSC 418 (3)	Introduction to Crop Sciences and Crop Growth & Management	7



Renewable Energy Systems Engineering

Course List

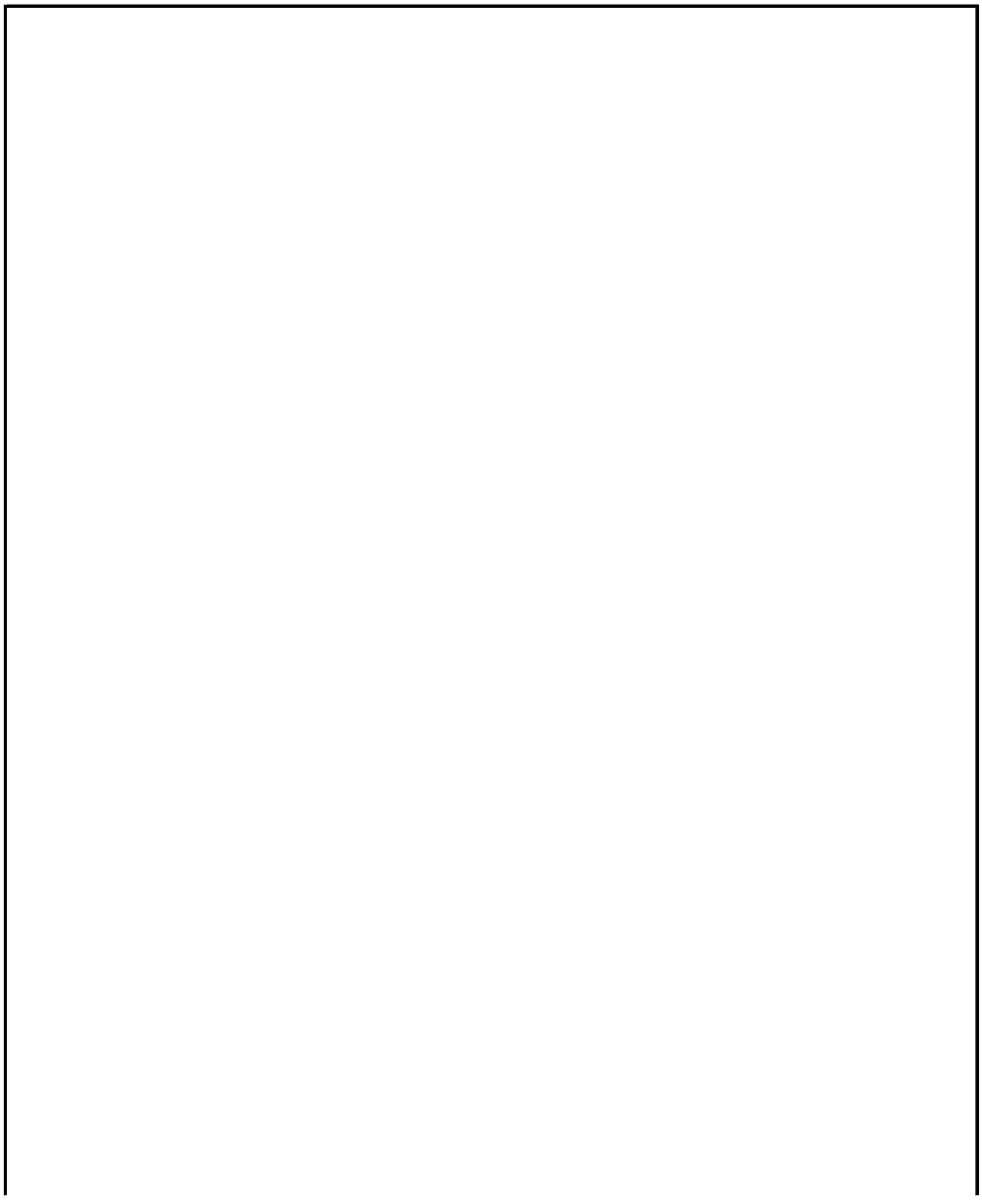
Code	Title	Hours
	Total Required:	**30**
Required courses:		**14**
ABE 341	Transport Processes in ABE	3
ABE 425	Eng Measure Systems	4
ABE 436	Renewable Energy Systems	3
ABE 488	Bioprocessing Biomass for Fuel	4

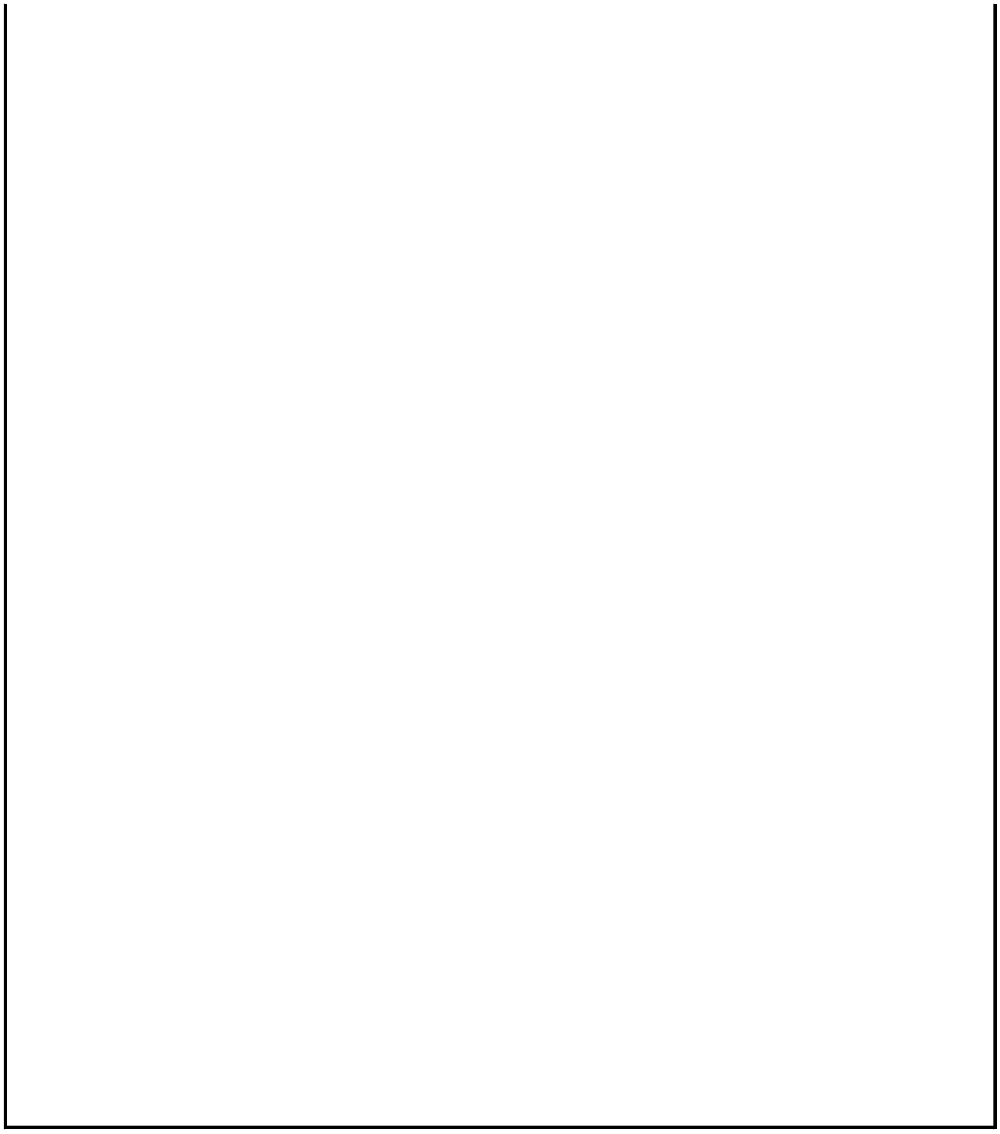
Select one of the following sets:		**6 to 8**
ATMS 201 (3) & ATMS 307 (3)	General Physical Meteorology; Climate Processes	6
CPSC 112 (4) & CPSC 415 (3)	Introduction to Crop Sciences; Bioenergy Crops	7
GEOL 107 (4) & GEOL 380 (4)	Physical Geology; Environmental Geology	8

Select one of the following sets:		**9 to 10**
Wind Energy		
TAM 251	Introductory Solid Mechanics (or ME 330)	3
CEE 300	Behavior of Materials	4
NPRE 475	Wind Power Systems	3

Solar Energy		
TAM 251	Introductory Solid Mechanics (or ME 330)	3
MSE 280	Engineering Materials	3
ECE 333	Green Electric Energy	3

Biofuels		
CHEM 232	Organic Chemistry I	3
CHBE 478	Bioenergy Technology	3
TAM 335	Introductory Fluid Mechanics	4

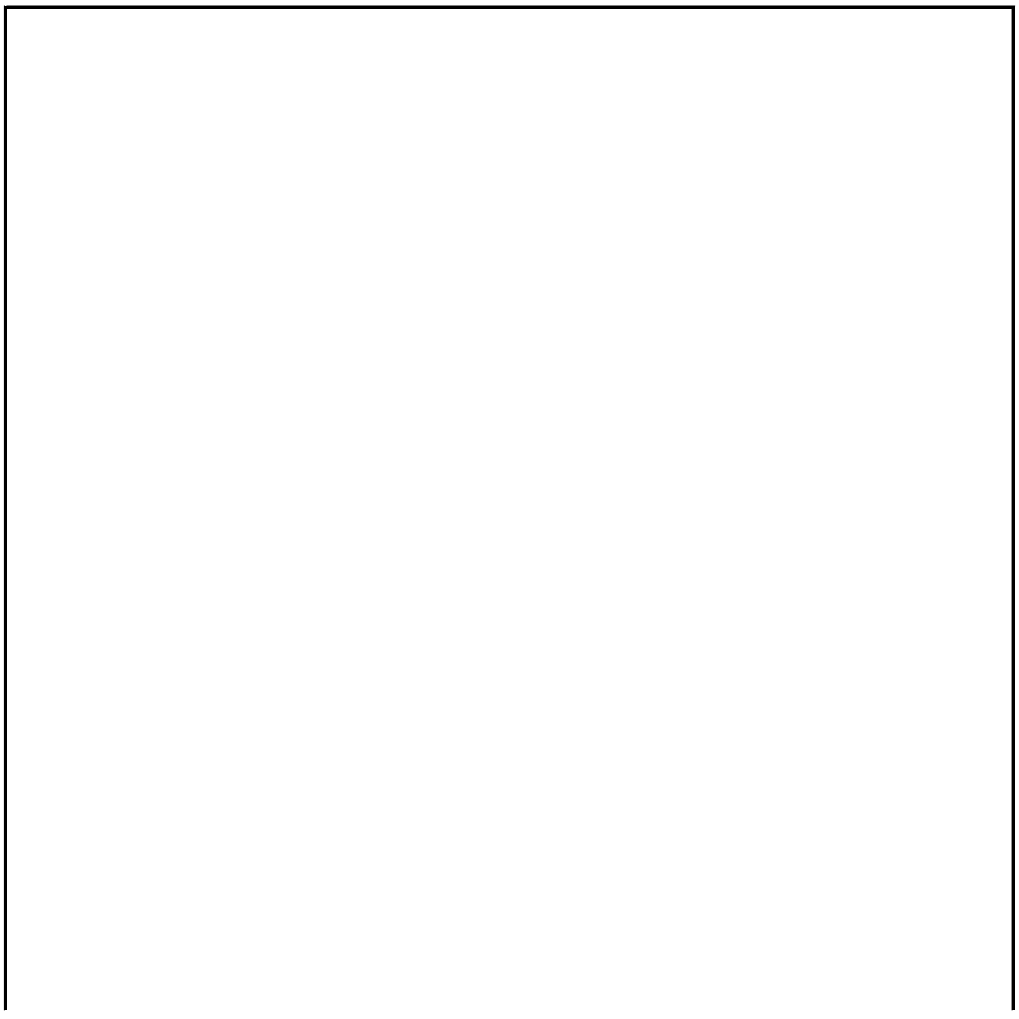


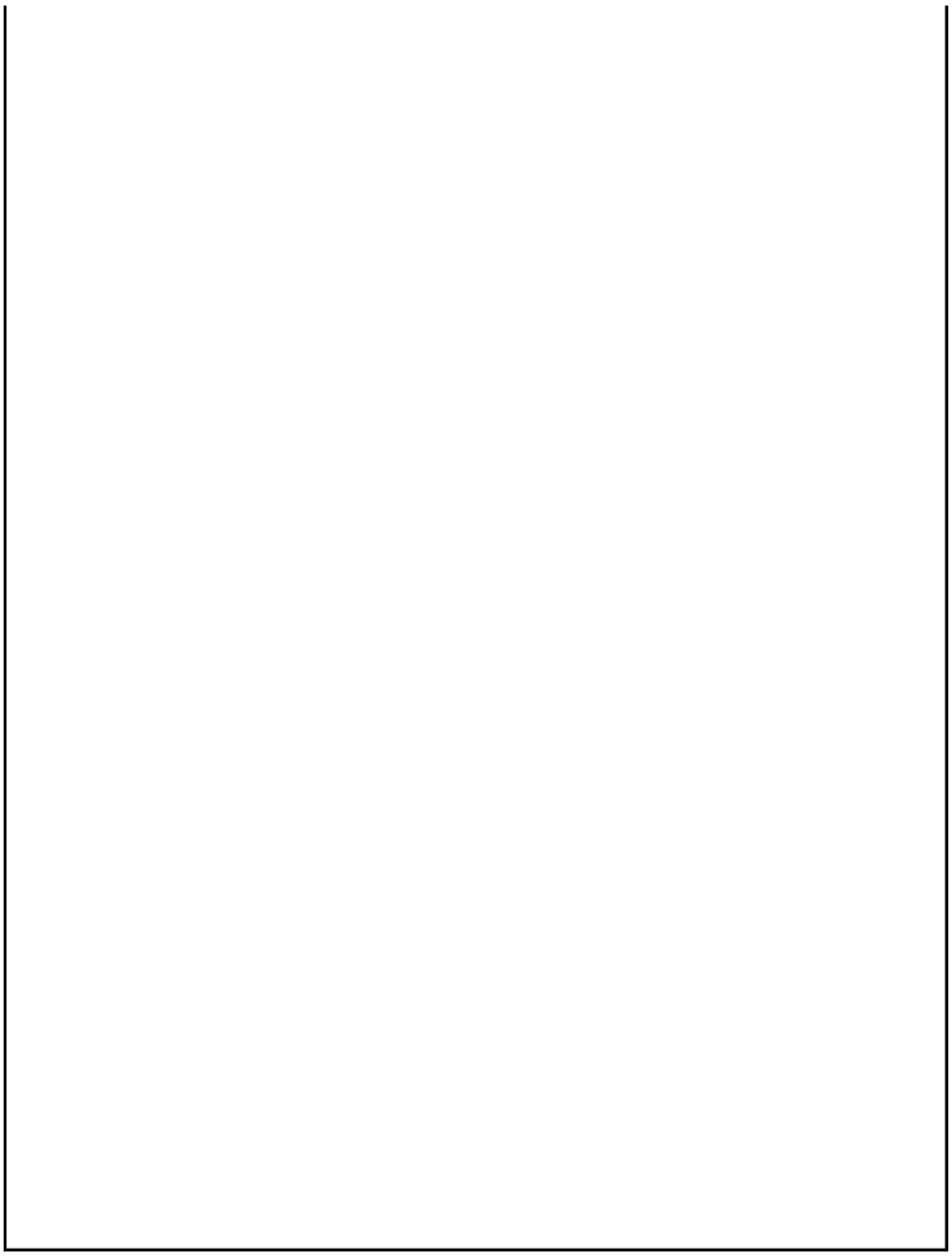


Soil and Water Resources Engineering

Course List

Code	Title	Hours
	Total Required:	**30**
Required courses		**10**
TAM 335	Introductory Fluid Mechanics	4
ABE 454	Environmental Soil Physics	3
ABE 456	Land & Water Resources Engineering	3
Select one from the following:		**4**
ABE 425	Eng Measure Systems	4
CEE 458	Water Resources Field Methods	4
Select one of the following:		**3**
ABE 458	NPS Pollution Modeling, Data Management and Analysis	2
ABE 459	Drainage and Water Management	3
Select one of the following sets:		**7**
CPSC 112 (4) & 437 (3)	Introduction to Crop Sciences and Principles of Agroecology	7
NRES 201 (4) & 475 (3) or 488 (3)	Introductory Soils and Environmental Microbiology or Soil Fertility & Fertilizers	7
Select six hours from the following:		**6**
ABE 450	International Water Project I	3
ABE 452	Engineering for Disaster Resilience	3
ABE 457	NPS Pollution Processes	2
ABE 458	NPS Pollution Modeling, Data Management and Analysis	3
ABE 459	Drainage and Water Management	3
CEE 330	Environmental Engineering	3
CEE 350	Water Resources Engineering	3
CEE 380	Geotechnical Engineering	3





Sustainable Ecological and Environmental Systems Engineering

Course List

Code	Title	Hours
	Total Required:	**30**
Required courses:		**18**
ABE 341	Transport Processes in ABE	3
ABE 425	Eng Measure Systems	4
TAM 335	Introductory Fluid Mechanics	4
CEE 330	Environmental Engineering	3
IB 150	Organismal & Evolutionary Biology	4

Select one of the following:		**3**
ABE 450	International Water Project I	3
ABE 451	International Water Project II	3
ABE 452	Engineering for Disaster Resilience	3
ABE 456	Land & Water Resources Engineering	3

Select one of the following:		**2 to 4**
ABE 436	Renewable Energy Systems	3
ABE 457	NPS Pollution Processes	2
ABE 458	NPS Pollution Modeling	3
ABE 459	Drainage & Water Management	3
ABE 476	Indoor Air Quality Engineering	4
CEE 434	Environmental Systems I	3
CEE 440	Fate Cleanup Environ Pollutant	4

Select two from one of the following sets:

Ecological Systems		**6 to 7**
IB 452	Ecosystem Ecology	3
NRES 219	Applied Ecology	3
NRES 348	Fish & Wildlife Ecology	3
NRES 362	Ecology of Invasive Species	3
NRES 418	Wetland Ecology & Management	3
NRES 419	Env & Plant Ecosystems	3
NRES 420	Restoration Ecology	3
NRES 429	Aquatic Ecosystem Conservation	3
NRES 439	Env & Sustainable Development	3
NRES 485	Stream Ecosystem Management	4

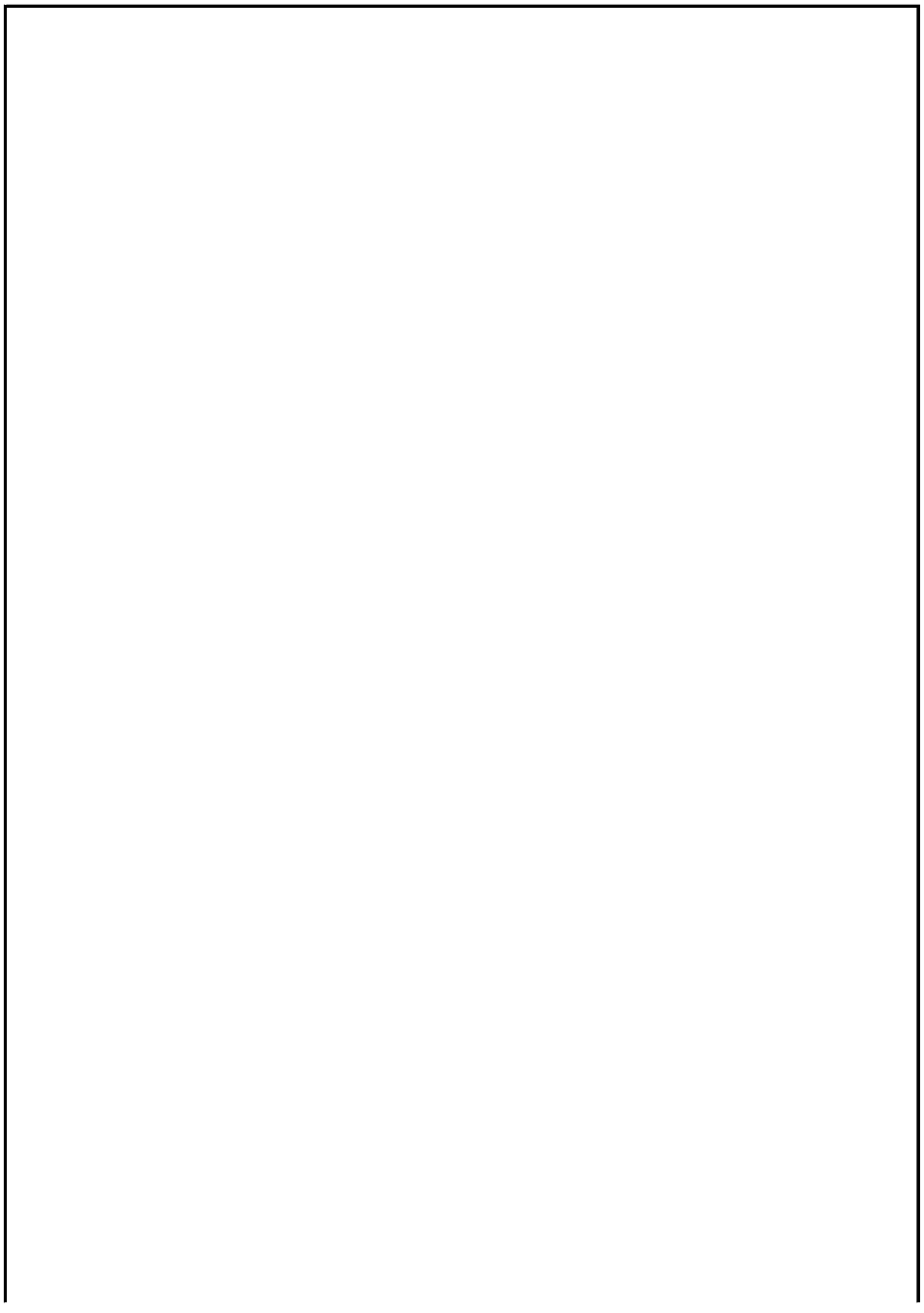
OR

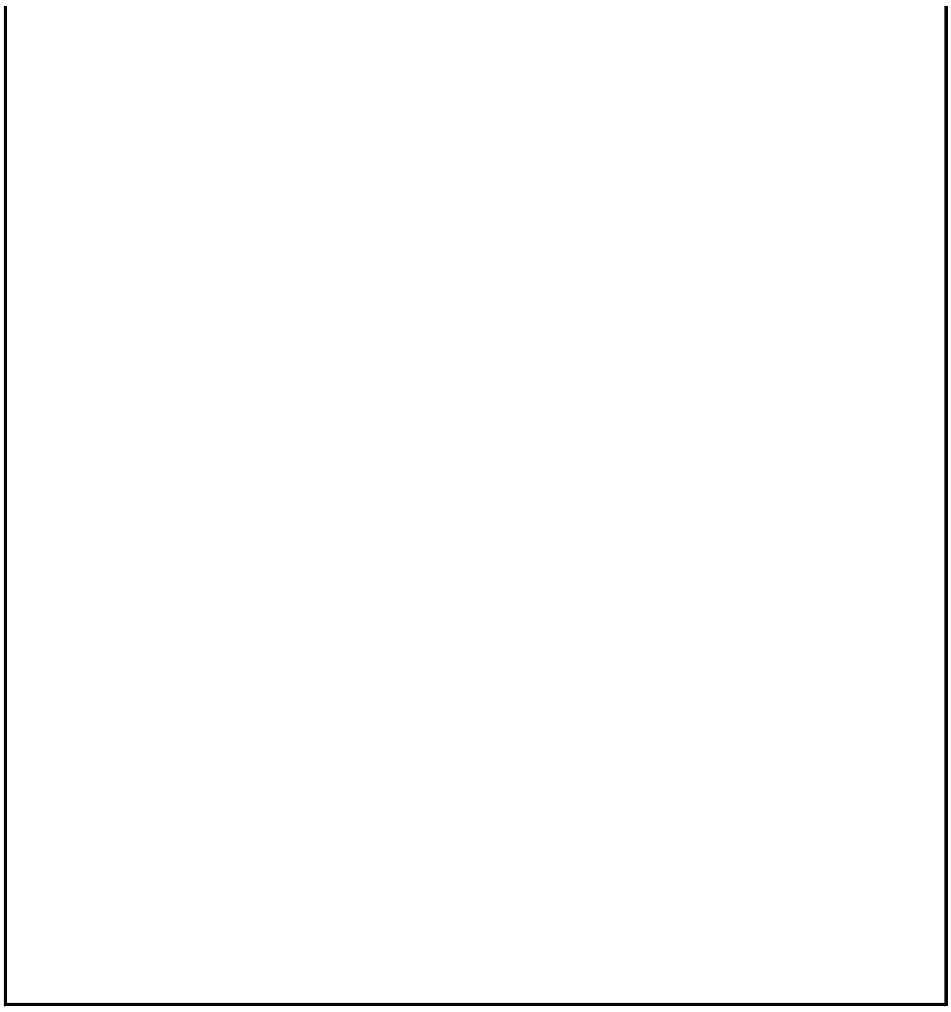
Horticultural Systems		**6 to 7**
HORT 100	Introduction to Horticulture	3

HORT 341	Green House Mgmt & Production	4
HORT 435	Urban Food Production	3

OR

Animal Systems		**7 to 8**
ANSC 100	Intro to Animal Sciences	4
ANSC 363	Behavior of Domestic Animals	4
IB 329	Animal Behavior	3





Synthetic Biological Engineering

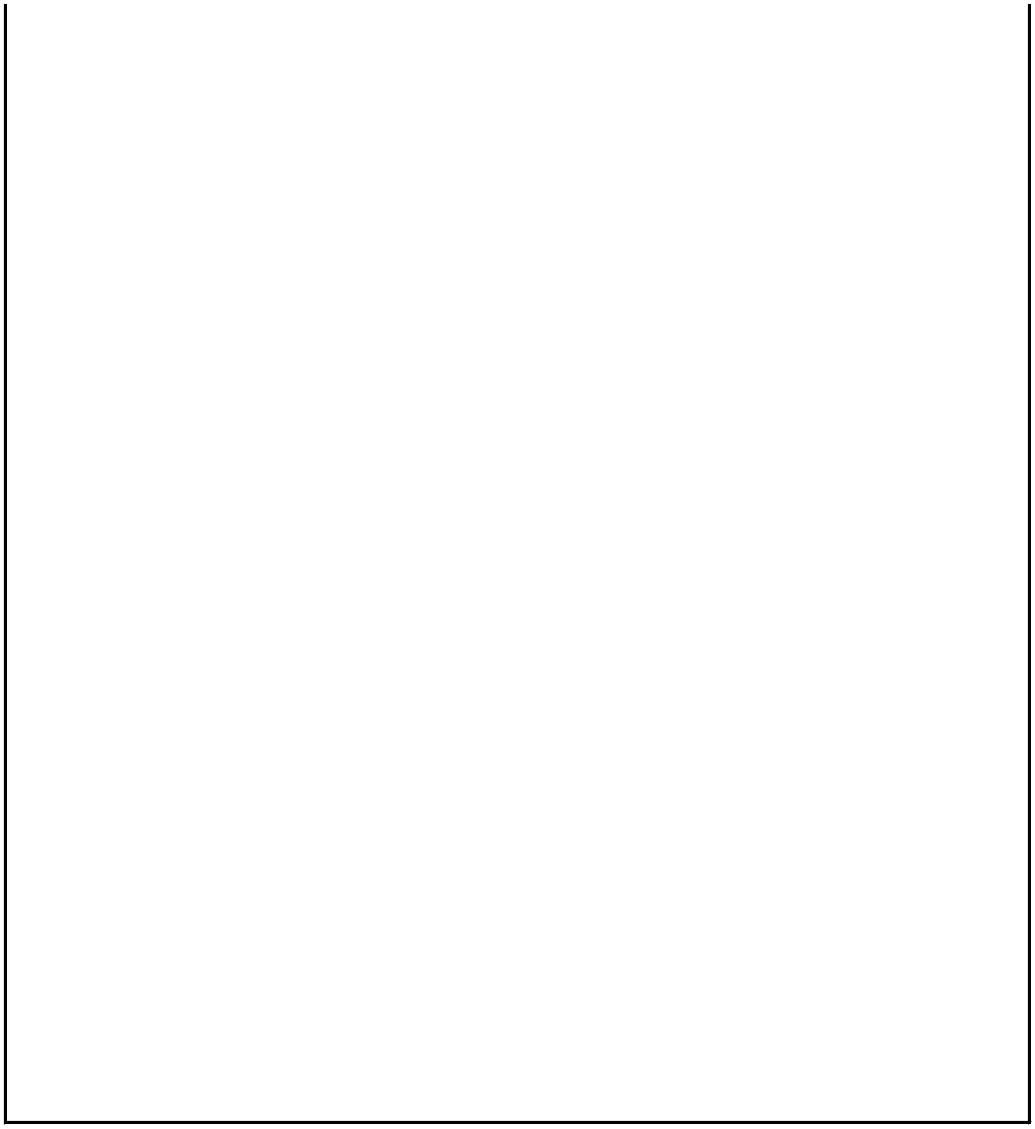
Course List

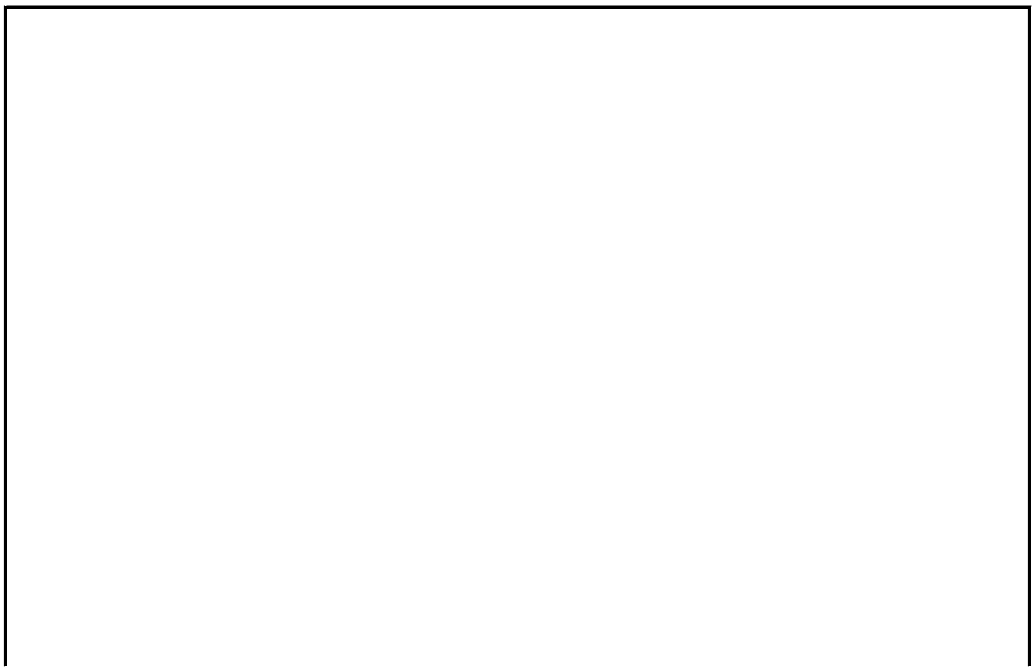
Code	Title	Hours
	Total Required:	**30**
Required courses		**18**
CHEM 232	Organic Chemistry	4
ABE 341	Transport Processes in ABE	3
ABE 425	Eng Measure Systems	4
ABE 446	Biological Nanoengineering	3
MCB 150	Molecular & Cellular Basis of Life	4

Select one course from the following:		**3**
CHBE 458	Synthetic Nanomaterials	3
CHBE 472	Techniques in Biomolecular Engineering	3
CHBE 473	Biomolecular Engineering	3
CHBE 474	Metabolic Engineering	3
BIOE 430	Intro Synthetic Biology	3
MSE 470	Design & Use of Biomaterials	3

Select 9 hours from the following (no more than 3 hr at the 100-200 level):		**9**
MCB 100	Introductory Microbiology	3
MCB 250	Molecular Genetics	3
MCB 252	Cells, Tissues, and Development	3
MCB 450	Introductory Biochemistry	3
MCB 424	Microbial Biochemistry	3
IB 150	Organismal & Evolutionary Biology	4
IB 204	Genetics	3
IB 432	Genes & Behavior	3
IB 472	Plant Molecular Biology	1
IB 473	Plant Genomics	1
IB 103	Introduction to Plant Biology	4
CPSC 261	Biotechnology in Agriculture	3
CPSC 265	Genetic Engineering Lab	3
CPSC 352	Plant Genetics	4
CPSC 452	Advanced Plant Genetics	3
CPSC 466	Genomics for Plant Improvement	2
IB 420	Plant Physiology	3
IB 421	Photosynthesis	3
IB 411	Bioinspiration	3
IB 104	Animal Biology	4
ANSC 100	Intro to Animal Sciences	4
ANSC 221	Cell, Metabolism, and Genetics	3
ANSC 224	Animal Reproduction and Growth	4
ANSC 350	Cellular Metabolism in Animals	3

ANSC 431	Advanced Reproductive Biology	3
ANSC 446	Population Genetics	3
NRES 201	Introductory Soils	4
NRES 475	Environmental Microbiology	3





Summary		
General Education requirements		12
Humanities	6	
Cultural Studies	3	
Additional SBS	3	
Composition I		4
Language Other Than English		4
Orientation and Professional Development		3
Foundational Mathematics and Science		33
Agricultural and Biological Engineering Technical Core		36
Concentration		30
Free Electives		6
Total for Graduation		128

This sample sequence is intended to be used only as a guide for degree completion. All students should work individually with their academic advisors to decide the actual course selection and sequence that works best for them based on their academic preparation and goals. Enrichment programming such as study abroad, minors, internships, and so on may impact the structure of this four-year plan. Course availability is not guaranteed during the semester indicated in the sample sequence. Students must fulfill their Language Other Than English requirement by successfully completing a third level of a language other than English. This sample curriculum plan makes the assumption that the foreign language graduation requirement has been satisfied by completing three years of study of a single foreign language in high school. For more information, see the corresponding section on the Degree General and Education Requirements page (http://catalog.illinois.edu/general-information/degree-general-

First Year

First Semester			Second Semester		
ABE 127	Intro to Agricultural & Biological Engrg	2	ABE 128	Applied Biology for ABEs	3
ENG 100	Grainger Engineering Orientation Seminar	1	PHYS 211	University Physics: Mechanics	4
MATH 221	Calculus I	4	MATH 231	Calculus II	3
CHEM 102	General Chemistry I	3	CHEM 104	General Chemistry II	3
CHEM 103	General Chemistry Lab I	1	CHEM 105	General Chemistry Lab II	1
Composition I or General Education course (Humanities or SBS with Cultural Studies)		4	Composition I or General Education course		3
		15			17

Gen Ed	16	including Comp I requirement
Orientation	3	
foundation	33	
core	36	
concen	30	
subtotal	118	
free	10	
total	128	

Second Year

First Semester			Second Semester		
ABE 227	Computer-Based Problem-Solving in ABE I	3	ABE 228	Computer-Based Problem-Solving in ABE II	3
CS 101	Intro Computing: Engrg & Sci	3	PHYS 212	University Physics: Elec & Mag	4
MATH 241	Calculus III	4	MATH 285	Intro Differential Equations	3
SE 101	Engineering Graphics & Design	3	MATH 257	Linear Algebra with Computational Applications	3
TAM 211	Statics	3	TAM 212	Introductory Dynamics	3
		16			16

totals by semester	128

Third Year

First Semester			Second Semester		
ABE 340	Thermodynamics for ABE	3	IE 300 or STAT 400	Analysis of Data or Statistics and Probability I	3
ECE 205	Electrical and Electronic Circuits	3	See list	Concentration course	4
See list	Concentration course	3	See list	Concentration course	3
See list	Concentration course	4	See list	Concentration course	4
Free Elective		3	Social/Behavioral Science course from: ECON 102, ACE 100, ACE 210, ACE 251, or ACE 255		3
		16			17

Fourth Year

First Semester			Second Semester		
ABE 430	Project Management	2	ABE 469	Industry-Linked Design Project	4
See list	Concentration course	3	See list	Concentration course	3
See list	Concentration course	3	See list	Concentration course	3
General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies		3	General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)		3
Free Elective		4	Free elective		3
		15			16

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First Year

First Semester			Second Semester		
ABE 127	Intro to Agricultural & Biological Engrg	2	ABE 128	Biology for ABEs	3
ENG 100	Grainger Engineering Orientation Seminar	1	PHYS 211	University Physics: Mechanics	4
MATH 221	Calculus I	4	MATH 231	Calculus II	3
CHEM 102	General Chemistry I	3	CHEM 104	General Chemistry II	3
CHEM 103	General Chemistry Lab I	1	CHEM 105	General Chemistry Lab II	1
Composition I or General Education course (Humanities or SBS with Cultural Studies)		4	Composition I or General Education course		3
		15			17

Gen Ed	16	
Orientation	3	
foundation	33	
core	36	
concen	30	
subtotal	118	
free	10	
total	128	

Second Year

First Semester			Second Semester		
ABE 227	Computer-Based Problem-Solving in ABE I	3	ABE 228	Computer-Based Problem-Solving in ABE II	3
CS 101	Intro Computing: Engrg & Sci	3	PHYS 212	University Physics: Elec & Mag	4
MATH 241	Calculus III	4	MATH 285	Intro Differential Equations	3
SE 101	Engienering Graphics & Design	3	MATH 257	Linear Algebra with Computational Applications	3
TAM 211	Statics	3	TAM 212	Introductory Dynamics	3
		16			16

totals by semester	128

Third Year

First Semester			Second Semester		
ABE 340	Thermodynamics for ABE	3	IE 300 or STAT 400	Analysis of Data or Statistics and Probability I	3
ECE 205	Electrical and Electronic Circuits	3	ABE 425	Engineering Measurement Systems	4
MCB 100	Introductory Microbiology	3	ABE 341	Transport Processes in ABE	3
CHEM 232	Elementary Organic Chemistry I	4	Choose 3 concentration hours from FSHN 471 or FSHN 481 and FSHN		3
Free elective		3	Social/Behavioral Science course from: ECON 102, ACE 100, ACE 210, ACE 251, or ACE 255		3
		16			16

Fourth Year

First Semester			Second Semester		
ABE 430	Project Management	2	ABE 469	Industry-Linked Design Project	4
ABE 488	Bioprocessing Biomass for Fuel	4	Choose 3 concentration hours from the 'Select 6 hours' list		3
Choose 3 concentration hours from the 'Select 6 hours' list		3	ABE 483	Engineering Properties of Food Materials	3
General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)		3	General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)		3
Free Elective		4	Free elective		3
		16			16

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First Year

First Semester			Second Semester		
ABE 127	Intro to Agricultural & Biological Engrg	2	ABE 128	Biology for ABEs	3
ENG 100	Grainger Engineering Orientation Seminar	1	PHYS 211	University Physics: Mechanics	4
MATH 221	Calculus I	4	MATH 231	Calculus II	3
CHEM 102	General Chemistry I	3	CHEM 104	General Chemistry II	3
CHEM 103	General Chemistry Lab I	1	CHEM 105	General Chemistry Lab II	1
Composition I or General Education course (Humanities or SBS with Cultural Studies)		4	Composition I or General Education course		3
		15			17

Gen Ed	16	including Comp I requirement
Orientation	3	
foundation	33	
core	36	
concen	30	
subtotal	118	
free	10	
total	128	

Second Year

First Semester			Second Semester		
ABE 227	Computer-Based Problem-Solving in ABE I	3	ABE 228	Computer-Based Problem-Solving in ABE II	3
CS 101	Intro Computing: Engrg & Sci	3	PHYS 212	University Physics: Elec & Mag	4
MATH 241	Calculus III	4	MATH 285	Intro Differential Equations	3
SE 101	Engienering Graphics & Design	3	MATH 257	Linear Algebra with Computational Applications	3
TAM 211	Statics	3	TAM 212	Introductory Dynamics	3
		16			16

totals by semester	128

Third Year

First Semester			Second Semester		
ABE 340	Thermodynamics for ABE	3	IE 300 or STAT 400	Analysis of Data or Statistics and Probability I	3
ECE 205	Electrical and Electronic Circuits	3	ABE 425	Engineering Measurement Systems	4
TAM 335	Inroductory Fluid Mechanics	4	ABE 341	Transport Processes in ABE	3
NRES 201 or CPSC 112		4	ABE 361	Func Analysis and Design of Agricultural Machine Sys	3
Free elective		3	Social/Behavioral Science course from: ECON 102, ACE 100, ACE 210, ACE 251, or ACE 255		3
		17			16

Fourth Year

First Semester			Second Semester		
ABE 430	Project Management	2	ABE 469	Industry-Linked Design Project	4
ABE 466	Engineering Off-Road Vehicles	3	NRES 488 or CPSC 418		3
TAM 251	Introductory Solid Mechanics	3	ABE 454 or ABE 426 or MSE 280		3
General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)		3	General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies		3
Free elective		4	Free elective		3
		15			16

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First Year

First Semester			Second Semester		
ABE 127	Intro to Agricultural & Biological Engrg	2	ABE 128	Biology for ABEs	3
ENG 100	Grainger Engineering Orientation Seminar	1	PHYS 211	University Physics: Mechanics	4
MATH 221	Calculus I	4	MATH 231	Calculus II	3
CHEM 102	General Chemistry I	3	CHEM 104	General Chemistry II	3
CHEM 103	General Chemistry Lab I	1	CHEM 105	General Chemistry Lab II	1
Composition I or General Education course (Humanities or SBS with Cultural Studies)		4	Composition I or General Education course		3
		15			17

Gen Ed	16	including Comp I requirement
Orientation	3	
foundation	33	
core	36	
concen	30	
subtotal	118	
free	10	
total	128	

Second Year

First Semester			Second Semester		
ABE 227	Computer-Based Problem-Solving in ABE I	3	ABE 228	Computer-Based Problem-Solving in ABE II	3
CS 101	Intro Computing: Engrg & Sci	3	PHYS 212	University Physics: Elec & Mag	4
MATH 241	Calculus III	4	MATH 285	Intro Differential Equations	3
SE 101	Engineering Graphics & Design	3	MATH 257	Linear Algebra with Computational Applications	3
TAM 211	Statics	3	TAM 212	Introductory Dynamics	3
		16			16

totals by semester	128

Third Year

First Semester			Second Semester		
ABE 340	Thermodynamics for ABE	3	IE 300 or STAT 400	Analysis of Data or Statistics and Probability I	3
ECE 205	Electrical and Electronic Circuits	3	ABE 425	Engineering Measurement Systems	4
ABE 436	Renewable Energy Systems	3	ABE 341	Transport Processes in ABE	3
Choose ATMS 201 or CPSC 112 or GEOL 107		4	Choose ATMS 307 or CPSC 415 or GEOL 380		3
Free elective		3	Social/Behavioral Science course from: ECON 102, ACE 100, ACE 210, ACE 251, or ACE 255		3
		16			16

Fourth Year

First Semester			Second Semester		
ABE 430	Project Management	2	ABE 469	Industry-Linked Design Project	4
ABE 488	Bioprocessing Biomass for Biofuels	4	Choose concentration courses from listed set of courses (Wind, Solar or Biof		3
Choose concentration courses from listed set of courses (Wind, Solar or Biof		3	Choose concentration courses from listed set of courses (Wind, Solar or Biof		3
General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)		3	General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)		3
Free elective		4	Free elective		3
		16			16

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First Year

First Semester			Second Semester		
ABE 127	Intro to Agricultural & Biological Engrg	2	ABE 128	Biology for ABEs	3
ENG 100	Grainger Engineering Orientation Seminar	1	PHYS 211	University Physics: Mechanics	4
MATH 221	Calculus I	4	MATH 231	Calculus II	3
CHEM 102	General Chemistry I	3	CHEM 104	General Chemistry II	3
CHEM 103	General Chemistry Lab I	1	CHEM 105	General Chemistry Lab II	1
Composition I or General Education course (Humanities or SBS with Cultural Studies)		4	Composition I or General Education course		3
		15			17

Gen Ed	16	including Comp I requirement
Orientation	3	
foundation	33	
core	36	
concen	30	
subtotal	118	
free	10	
total	128	

Second Year

First Semester			Second Semester		
ABE 227	Computer-Based Problem-Solving in ABE I	3	ABE 228	Computer-Based Problem-Solving in ABE II	3
CS 101	Intro Computing: Engrg & Sci	3	PHYS 212	University Physics: Elec & Mag	4
MATH 241	Calculus III	4	MATH 285	Intro Differential Equations	3
SE 101	Engienering Graphics & Design	3	MATH 257	Linear Algebra with Computational Applications	3
TAM 211	Statics	3	TAM 212	Introductory Dynamics	3
		16			16

totals by semester	128	(check)

Third Year

First Semester			Second Semester		
ABE 340	Thermodynamics for ABE	3	IE 300 or STAT 400	Analysis of Data or Statistics and Probability I	3
ECE 205	Electrical and Electronic Circuits	3	ABE 425 or CEE 458		4
NRES 201 or CPSC 112	Introductory Soils or Soil Fertility & Fertilizers	4	ABE 454	Environmental Soil Physics	3
TAM 335	Introductory Fluid Mechanics	4	ABE 456	Land & Water Resource Engineering	3
Free Elective		3	Social/Behavioral Science course from: ECON 102, ACE 100, ACE 210, ACE 251, or ACE 255		3
		17			16

Fourth Year

First Semester			Second Semester		
ABE 430	Project Management	2	ABE 469	Industry-Linked Design Project	4
ABE 459	Drainage and Water Management	3	NRES 475 or NRES 488 or CPSC 437		3
Choose 3 concentration hours from the 'Select 6 hours' list		3	Choose 3 concentration hours from the 'Select 6 hours' list		3
General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)		3	General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies		3
Free Elective		4	Free Elective		3
		15			16

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First Year

First Semester			Second Semester		
ABE 127	Intro to Agricultural & Biological Engrg	2	ABE 128	Biology for ABEs	3
ENG 100	Grainger Engineering Orientation Seminar	1	PHYS 211	University Physics: Mechanics	4
MATH 221	Calculus I	4	MATH 231	Calculus II	3
CHEM 102	General Chemistry I	3	CHEM 104	General Chemistry II	3
CHEM 103	General Chemistry Lab I	1	CHEM 105	General Chemistry Lab II	1
Composition I or General Education course (Humanities or SBS with Cultural Studies)		4	Composition I or General Education course		3
		15			17

Gen Ed	16	including Comp I requirement
Orientation	3	
foundation	33	
core	36	
concen	30	
subtotal	118	
free	10	
total	128	

Second Year

First Semester			Second Semester		
ABE 227	Computer-Based Problem-Solving in ABE I	3	ABE 228	Computer-Based Problem-Solving in ABE II	3
CS 101	Intro Computing: Engrg & Sci	3	PHYS 212	University Physics: Elec & Mag	4
MATH 241	Calculus III	4	MATH 285	Intro Differential Equations	3
SE 101	Engienering Graphics & Design	3	MATH 257	Linear Algebra with Computational Applications	3
TAM 211	Statics	3	TAM 212	Introductory Dynamics	3
		16			16

totals by semester	128	(check)

Third Year

First Semester			Second Semester		
ABE 340	Thermodynamics for ABE	3	IE 300 or STAT 400	Analysis of Data or Statistics and Probability I	3
ECE 205	Electrical and Electronic Circuits	3	ABE 425	Engineering Measurement Systems	4
CEE 330	Environmental Engineering	3	ABE 341	Transport Processes in ABE	3
TAM 335	Introductory Fluid Mechanics	4	IB 150	Organismal & Evolutionary Biology	4
Free Elective		3	Social/Behavioral Science course from: ECON 102, ACE 100, ACE 210, ACE 251, or ACE 255		3
		16			17

Fourth Year

First Semester			Second Semester		
ABE 430	Project Management	2	ABE 469	Industry-Linked Design Project	4
Select one of ABE 450, 451, 452, or 456		3	Choose one of two courses from the same set (Ecological, Horticultural or Anima		3
Choose one of two courses from the same set (Ecological, Horticultural or Animal)		3	Select one of ABE 436, 457, 458, 459, 476 or CEE 434, 440		3
General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)		3	General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)		3
Free Elective		4	Free elective		3
		15			16

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First Year

First Semester			Second Semester		
ABE 127	Intro to Agricultural & Biological Engrg	2	ABE 128	Biology for ABEs	3
ENG 100	Grainger Engineering Orientation Seminar	1	PHYS 211	University Physics: Mechanics	4
MATH 221	Calculus I	4	MATH 231	Calculus II	3
CHEM 102	General Chemistry I	3	CHEM 104	General Chemistry II	3
CHEM 103	General Chemistry Lab I	1	CHEM 105	General Chemistry Lab II	1
Composition I or General Education course (Humanities or SBS with Cultural Studies)		4	Composition I or General Education course		3
		15			17

Gen Ed	16	including Comp I requirement	
Orientation	3		
foundation	33		
core	36		
concen	30		
subtotal	118		
free	10		
total	128		

Second Year

First Semester			Second Semester		
ABE 227	Computer-Based Problem-Solving in ABE I	3	ABE 228	Computer-Based Problem-Solving in ABE II	3
CS 101	Intro Computing: Engrg & Sci	3	PHYS 212	University Physics: Elec & Mag	4
MATH 241	Calculus III	4	MATH 285	Intro Differential Equations	3
SE 101	Engienering Graphics & Design	3	MATH 257	Linear Algebra with Computational Applications	3
TAM 211	Statics	3	TAM 212	Introductory Dynamics	3
		16			16

totals by semester	128	(check)

Third Year

First Semester			Second Semester		
ABE 340	Thermodynamics for ABE	3	IE 300 or STAT 400	Analysis of Data or Statistics and Probability I	3
ECE 205	Electrical and Electronic Circuits	3	ABE 425	Engineering Measurement Systems	4
Choose one concentration course from 'Select 9 hours' list		3	ABE 341	Transport Processes in ABE	3
MCB 150	Molecular & Cellular Basis of Life	4	CHEM 232	Organic Chemistry	4
Free Elective		3	Social/Behavioral Science course from: ECON 102, ACE 100, ACE 210, ACE 251, or ACE 255		3
		16			17

Fourth Year

First Semester			Second Semester		
ABE 430	Project Management	2	ABE 469	Industry-Linked Design Project	4
Choose one concentration course from 'select one' list		3	ABE 446	Biological Nanoengineering	3
Choose one concentration course from 'Select 9 hours' list		3	Choose one concentration course from 'Select 9 hours' list		3
General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)		3	General education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies		3
Free Elective		4	Free elective		3
		15			16