Add Undergraduate Course

Course Attributes

Subject Abbreviation:	BE-Biosystems Engineering	**Catalog Title:**	Biosystems Engineering Thermodynamics	☐ **Additional Fee?**
Course Number:	3120	**Transcript Title:**		Justification
Effective Term:	Spring 2017	**Cross-reference(s):**		
College:	Engr, Comp, and Appl Sci	**Grade Mode:**	Standard Letter	
Department:	Environmental Engr & Earth Sci			

Form

User ID:	walker4	**Name:**	Terry Walker
Date:	02/03/2017	**Number:**	26390

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

Rationale for Add Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

Schedule Types

- ○ **Field Course**
- ○ **Independent Study**
- ○ **Internship**
- ○ **Lab No Fee**
- ○ **Lab With Fee**
- ◉ **Lecture**
- ○ **Other**
- ○ **Seminar**
- ○ **Studio**
- ○ **Tutorial**

Projected Enrollment

Year 1: 22
Year 2: 22
Year 3: 25
Year 4: 30

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Weighted percentages of assignments

Homework	20%
Midterm	30%
Final Exam	40%
Project	10%

Catalog Description

Introduction of basic thermodynamic principles pertaining to biosytems engineering with emphasis on biochemical, biomechanical, and ecological problems.

☑ **Prerequisite(s)** ☐ **Corequisite(s)**

CE 2010 Statics

Required course for students in

BE major

Statement of need and justification based on assessment of student learning outcomes

Required in the curriculum

Textbook(s)

Haynie DT. 2008. Biological Thermodynamics. 2nd ed. Cambridge University Press, UK.
Elliot and Lira, 2012. Introductory Chemical Eng. Thermodynamics, 2nd ed., Prentice Hall, NY
and Handouts

Learning Objectives

The goal of the course is to learn the basic biosystems engineering thermodynamic principles and be able to solve basic thermodynamics problems pertaining to biological and environmental systems with emphasis on biochemical, biomechanical and ecological phenomena.

Students will be able to:

1. solve problems based on the first law of thermodynamics
2. solve problems based on the second law of thermodynamics
3. apply Gibb's free energy principles for biological examples and reaction kinetics
4. solve problems related to phase equilibria and psychrometics.

Topical Outline

Week	Topic
1	Overview and Sustainability of Biosystems Thermodynamics
2	Energy and 1st Law of Thermodynamics
3	Energy Balances and Heat Engines
4	Entropy and 2nd Law of Thermodynamics
5	Thermodynamics of Bioprocesses
6	Equations of State
7	Phase Equilibria
8	Gibbs Free Energy
9	Reaction Kinetics
10	Ideal Gas Mixtures and Engines
11	Exergy and Thermoeconomics
12	Psychrometrics
13	Statistical Biothermodynamics
14	Final project problems due and review
15	FE Exam problems and review

Syllabus

Upload File: BE3120-syllabus-20170203173409.pdf

Kevin Thomas Finneran — Digitally signed by Kevin Thomas Finneran Date: 2017.02.09 14:57:22 -05'00'

Chair, Department Curriculum Committee — Date

David L. Freedman — Digitally signed by David L. Freedman DN: cn=David L. Freedman, o=Clemson University, ou=Environmental Engineering & Earth Sciences, email=dfreedm@clemson.edu, c=US Date: 2017.02.10 00:32:34 -05'00'

Department Chair — Date

Christopher Kitchens — 2/17/2017

Chair, College Curriculum Committee — Date

Bradley Putman — 2/20/2017

College Dean — Date

Director, Calhoun Honors College — Date

John D. Kieffer — 3/3/2017

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Provost — Date

President — Date

BE 3120: Biosystems Engineering Thermodynamics
Syllabus

BE 3120: Biosystems Engineering Thermodynamics (3,0) S *Prereq: CE 2010 Statics*
Introduction of basic thermodynamic principles pertaining to biosytems engineering with emphasis on biochemical, biomechanical, and ecological problems.

Instructor: Terry H. Walker Phone: 656-0351
114 Biosystems Research Complex (across from Hendrix Center)
Email: walker4@clemson.edu

Office Hours: Open door policy

Meeting Times: **TR**, 3:30-4:40, Brackett 113
Much of the class will be paperless. Be sure to check emails or dropbox regularly for lecture files and announcements.

Required Texts:
Haynie DT. 2008. Biological Thermodynamics. 2nd ed. Cambridge University Press, UK.
Elliot and Lira, 2012. Introductory Chemical Eng. Thermodynamics, 2nd ed., Prentice Hall, NY

References:
Moran, et al., 2015, Fundamentals of Engineering Thermodynamics, 8th ed., Wiley: NY
Kyle BG. 1992. *Chemical and Process Thermodynamics*. 2nd ed. Prentice Hall: NY
Doran, P.M. 2013. *Bioprocess Engineering Principles*. 2nd ed. Academic Press: Oxford, UK.
Johnson, A.T. 1999. *Biological Process Engineering.* John Wiley: NY
Perry R.H. and C.H. Chilton. 2007. *Chemical Engineers' Handbook.* 8th ed. McGraw Hill: NY
McGraw Hill Thermodynamic FE Exam Questions:
http://highered.mheducation.com/sites/0072884959/student_view0/fe_exam_questions.html

Goals and Objectives:
The goal of the course is to learn the basic biosystems engineering thermodynamic principles. By the end of the course students should be able to solve basic thermodynamics problems pertaining to biological and environmental systems with emphasis on biochemical, biomechanical and ecological phenomena.

BE Curriculum Objectives: To produce engineering graduates with the ability to analyze and design physical and biological systems, and to demonstrate that they have achieved the ABET criteria outcomes and preparation for the FE exam in thermodynamics.

Grading Policy:	Weighting
Homework	20%
Midterm	30%
Final Exam	40%
Project	10%

Grading Scale:	
A:	90-100
B:	80-89
C:	70-79
D:	60-69
F:	below 60

Course Policies:

1. Missed exams cannot be made up without prior approval or doctor's certification of illness.
2. University policies on academic integrity, as outlined in the Clemson Code of Student Conduct will be upheld in this course. You may consult with fellow students when working on homework assignments; however, the work you turn in must be your own.
3. Homework will be graded on a 2-point scale (or check system). 0 is no credit meaning that either none or very little of the problems were completed. 1 (or check minus) is typically given for missing problems or less than 50% of the problems correct. 2 (or check) is typically given for greater than 50% correct and significant effort is shown. Late homework will be accepted with a point penalty after the due date.
4. All work submitted for a grade must be your own, unless group work is assigned. All text included in assignments that was written by someone other than the student must be correctly quoted and cited.
5. Please check your Clemson email address at least once a day for potential messages dealing with this course. Do not forward your Clemson mail to another account (Yahoo, AOL, etc.) as those accounts tend to have issues like full in-boxes and limitations on attachments.
6. Students are expected to wait for 15 minutes if the professor is late for class. Class participation is expected in all classes.
7. Please see me privately if you have special needs in this course.

Project: Each student will formulate an advanced biosystems engineering problem (biochemical, biomechanical or bioenvironmental) with solution determined in EXCEL spreadsheet.

Learning Objectives:

Students will be able to:

1. solve problems based on the first law of thermodynamics
2. solve problems based on the second law of thermodynamics
3. apply Gibb's free energy principles for biological examples and reaction kinetics
4. solve problems related to phase equilibria and psychrometics.

Lecture Topics: (Tentative)

Week	Topic	Reference/chapter
1	Overview and Sustainability of Biosystems Thermodynamics	Handout (Arrhenius), Kilowatt Ours
2	Energy and 1st Law of Thermodynamics	Ch. 1 (Elliot and Lira)
3	Energy Balances and Heat Engines	Ch. 2,3 (Elliot and Lira)
4	Entropy and 2nd Law of Thermodynamics	Ch. 4 (Elliot and Lira)
5	Thermodynamics of Bioprocesses	Ch. 5,6 (Elliot and Lira)
6	Equations of State	Ch. 7,8 (Elliot and Lira)
7	Phase Equilibria	Ch. 9 (Elliot and Lira)
8	Gibbs Free Energy	Handout (Haynie)
9	Reaction Kinetics	Handout (Haynie)
	Midterm Exam	
10	Ideal Gas Mixtures and Engines	Handout (Moran)
11	Exergy and Thermoeconomics Spring Break	Handout (Moran)
12	Psychrometrics	Handout (Moran)
13	Statistical Biothermodynamics	Handout (Haynie)
14	Final project problems due and review	
15	FE Exam problems and review	
	Final Comprehensive Exam	

Clemson Academic Integrity Policy

"As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form." Please refer to http://www.clemson.edu/academics/academic-integrity/

Disabilities Statement

Students with disabilities who need accommodations should make and appointment with Dr. Arlene Stewart, Director of Disability Services, to discuss specific needs within the first month of classes. Students should present a Faculty Accommodation Letter (FAL) from Student Disabilities Services (SDS) when they meet with instructors. SDS is located in Suite 239 Academic Success Bldg (656-6848; sds-l@clemson.edu). Please be aware that accommodations are not retroactive and a new FAL must be presented each semester.

Change Undergraduate Course

Change a Course

Subject:	BE-Biosystems Engineering
Number:	3200
Effective Term:	Fall 2017
Title:	Principles & Prac of Geomatics
Honors Course:	
☐ Add Honors Course:	
Last Term Course was taught:	201508

Brief Statement of Change Based on Assessment Results:
Add ENGR 2100/2101 as prerequisite or concurrent enrollment

Rationale for Changing a Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Prerequisite(s) / Corequisite(s)

From	Preq: MATH 1080; Coreq: BE 3220
To	Preq: MATH 1080; Preq or concurrent enrollment: ENGR 2100/2101; Coreq: BE 3220

Form

User ID:	cdrapch	**Name:**	Caye Drapcho
Date:	12/08/2016	**Number:**	28433

Kevin Thomas Finneran Digitally signed by Kevin Thomas Finneran
Date: 2017.02.09 15:03:05 -05'00'

Chair, Department Curriculum Committee — Date

David L. Freedman
Digitally signed by David L. Freedman
DN: cn=David L. Freedman, o=Clemson University, ou=Environmental Engineering & Earth Sciences, email=dfreedm@clemson.edu, c=US
Date: 2017.02.10 00:37:15 -05'00'

Department Chair — Date

Christopher Kitchens — 2/17/2017

Chair, College Curriculum Committee — Date

Bradley Putman — 2/20/2017

College Dean — Date

Director, Calhoun Honors College — Date

John D. Wiffin — 3/3/2017

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Provost — Date

President — Date

Change Undergraduate Course

Change a Course

Subject: BE-Biosystems Engineering
Number: 4740
Effective Term: Fall 2017
Title: B E Design/Proj Mgt
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201508

Brief Statement of Change Based on Assessment Results:
Simplify catalog statement; Reduce credit hours from 2 to 1 (due to deletion of lab section)

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☑ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Catalog Title

From Biosystems Engineering Design/Project Managment
To Biosystems Engineering Design Project Managment

☑ Change Transcript Title

From B E Design/Proj Mgt
To BE Design Proj Mgt

☑ Change of Credit

From
Fixed Credit Course

Credit Hrs	Contact Hrs
2	1

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

To
Fixed Credit Course

Credit Hrs	Contact Hrs
1	1

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

☑ Change Catalog Description

From Study of biological systems design using hydrology principles, fluid mechanics, bioprocessing, heat/mass transfer, instrumentation, mechanical unit operations and structural principles for project design, scheduling, and cost estimation. Topics also include engineering ethics, professional development, written and oral communication, and job skills. Senior portfolios will also be developed.

To Concepts of project management and professionalism including project scheduling, cost estimation, engineering ethics, professional development, written and oral communication, and job skills. Senior portfolios will be developed

Learning Objectives

The student will demonstrate:
- an ability to function on multidisciplinary teams
- an understanding of professional and ethical responsibility
- an ability to communicate effectively
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

Topical Outline

Week	Lecture Topic
1	Introduction to BioSysEng Venture Capital Corporation and Mini-Design Competition
2	Project management
2	Mini Design
3	Ethics in Design.
3	Professional Ethics, Robert J. Rutland Institute for Ethics
4	Professional Ethics, Robert J. Rutland Institute for Ethics
4	E-porfolio
5	*The Engineering Professional- Dr. Tom Dodd, NCEES
6	Parliamentary Procedures
6	*Engineering Economics, Dr. Tom Owino
7	*Engineering Economics, Dr. Tom Owino

8 *Engineering Economics, Dr. Tom Owino
8 *Engineering Economics, Dr. Tom Owino
9 *Engineering Economics, Dr. Tom Owino
10 Engineering Econ. Test
11 Public Speaking / Oral Presentation,
12 Role of Codes and Standards in Design Projects,
13 Role of Codes and Standards in Design Projects,
14 **Clemson Career Centers - Interviewing and the Job Search..
15 Class wrap-up

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Engineering Notebook 20
Test 20
Portfolio 25
Participation 10
Resume Plus 25

Syllabus

Upload File: Syllabus BE4740-20161207144540.doc

Description: BE 4740 syllabus

Form

User ID: cdrapch **Name:** Caye Drapcho
Date: 12/08/2016 **Number:** 28439

Kevin Thomas Finneran Digitally signed by Kevin Thomas Finneran
Date: 2017.02.15 08:29:11 -05'00'

Chair, Department Curriculum Committee — Date

David L. Freedman — Digitally signed by David L. Freedman DN: cn=David L. Freedman, o=Clemson University, ou=Environmental Engineering & Earth Sciences, email=dfreedm@clemson.edu, c=US Date: 2017.02.15 01:28:40 -05'00' — 2/15/2017

Department Chair — Date

Christopher Kitchens — 2/17/2017

Chair, College Curriculum Committee — Date

Bradley Putman — 2/20/2017

College Dean — Date

Director, Calhoun Honors College — Date

John D. Wiffin — 3/3/2017

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Provost — Date

President — Date

BE 4740
Biosystems Engineering Design/Project Management

1. *Meeting times:* Lecture class meets on Friday 10:10 – 110:00 AM in 233 Brackett Hall.

2. Concepts of project management and professionalism including project scheduling, cost estimation, engineering ethics, professional development, written and oral communication, and job skills. Senior portfolios will be developed.

3. Text: Park, C. S. Fundamentals of Engineering Economics Prentice Hall. 2006. (Optional)

4. Resources: Handouts
Presentations by professionals
Professional mentor(s)
Academic mentor(s)

5. Prerequisite: Senior Standing in Biosystems Engineering

6. Credit: 1 Credit Hour

7. *Instructor:* Dr. Tom O. Owino, Associate Professor, Biosystems Engineering Program, Dept. of Environmental Engineering and Earth Sciences; Office – 441A Bracket Hall, Phone - 656-4041, E-mail: towino@clemson.edu; Office Hours 9:00-12:00 Th or by appointment.

7. Learning Objectives

Students will be able to:
- function on multidisciplinary teams
- understand professional and ethical responsibility as it pertains to Biosystems Engineering practice
- communicate effectively
- understand the impact of engineering solutions in a global, economic, environmental, and societal context

8. Computer Experiences:
- Analysis and design using professional software
- Power Point presentations
- Electronic Portfolio

9. Letter grades will be assigned using a 10-point scale so that:

> 90	A
80-90	B
70-80	C
60-70	D
< 60	F

10. Grading will be weighted as follows:

Item	Percent
Professional Development	
Engineering Notebook	20
Test	20
Portfolio[1]	25
Participation	10
Resume Plus	25
TOTAL[2]	100

11. *Attendance Policy:*
Regular and punctual attendance at all classes is the responsibility of each student. College work proceeds at such a pace that regular attendance is necessary in order for the student to obtain maximum benefits from instruction. All absences are matters to be resolved between the instructor and student. If a student finds it necessary to be absent from class, it is the student's responsibility to make up resulting deficiencies.

The instructor reserves the right to reduce the semester grade if a student has more than two unexcused absences. If it does become necessary to miss class, the student must take the responsibility to make up any work missed and obtain class notes from another student.

Mandatory First Day Class Attendance Policy: All students are required to attend the first scheduled day of classes for which they are registered. A student who cannot attend the first class is responsible for contacting the instructor to indicate intent to remain in that class. If a student does not attend the first class meeting or make contact with the instructor by the second class meeting or the last day to add, whichever comes first, then the instructor may drop that student from the class.

12. *Miscellaneous:*
I strive to be on time for class and anticipate that each student will do likewise. If I will be unavailable to teach class, I will try to inform you so that you won't come unnecessarily. If I am not in class within 10 minutes of the scheduled time, please check with Cynthia Gravely in 445 Brackett Hall. Then you are free to leave if I am not located.

Finally, I have tried to estimate the time required to cover various topics, but we may need to adjust the schedule somewhat.

13. *Academic Integrity*: "As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form."

1 At the time of her/his individual final oral presentations, each student shall submit a complete digital copy of their portfolio.

Schedule for *BioSysEng Venture Capital Corporation* Meetings. (Lectures subject to change.)

Week	Lecture Topic
1	Introduction to *BioSysEng Venture Capital Corporation and Mini-Design Competition*
2	Strategies of Effective Project Management
3	Professional Ethics, Robert J. Rutland Institute for Ethics
4	Development of E-porfolio
5	*The Engineering Professional- Dr. Tom Dodd, NCEES
6	*Engineering Economics, Dr. Tom Owino
7	*Engineering Economics, Dr. Tom Owino
8	Portofolio review and discussion
9	Effective Communication Skills
10	**Engineering Economics Test**
11	Public Speaking / Oral Presentation Skills
12	Role of Codes and Standards in Design Projects
13	Role of Codes and Standards in Design Projects
14	*Clemson Career Centers - Interviewing and the Job Search skills
	THANKS GIVING
15	Final Presentations

1. Engineering notebooks may be reviewed at any time.

Delete Undergraduate Course

Delete a Course

Subject:	BE-Biosystems Engineering
Number:	4741
Effective Term:	Fall 2017
Title:	Be Dsgn/Proj Mgt Lab
☐ Delete Honors Course:	
Last Term Course was taught:	999999

Brief Statement of Change Based on Assessment Results:
Deleting lab portion (and adding 1 credit to BE 4750)

Rationale for Delete Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☑ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

Form

User ID:	cdrapch	**Name:**	Caye Drapcho
Date:	12/08/2016	**Number:**	28455

Kevin Thomas Finneran Digitally signed by Kevin Thomas Finneran
Date: 2017.02.09 15:03:31 -05'00'

Chair, Department Curriculum Committee — Date

David L. Freedman Digitally signed by David L. Freedman
DN: cn=David L. Freedman, o=Clemson University, ou=Environmental Engineering & Earth Sciences, email=dfreedm@clemson.edu, c=US
Date: 2017.02.10 00:39:46 -05'00'

Department Chair — Date

Christopher Kitchens 2/17/2017

Chair, College Curriculum Committee — Date

Bradley Putman 2/20/2017

College Dean — Date

Director, Calhoun Honors College — Date

John D. Niff 3/3/2017

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Provost — Date

President — Date

Change Undergraduate Course

Change a Course

Subject: BE-Biosystems Engineering
Number: 4750
Effective Term: Fall 2017
Title: B E Capstone Design
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201608

Brief Statement of Change Based on Assessment Results:
Increase credit hour; change prerequisite and change catalog description

Rationale for Changing a Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☑ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change of Credit

From
Fixed Credit Course

Credit Hrs	Contact Hrs
2	4

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

To
Fixed Credit Course

Credit Hrs	Contact Hrs
3	6

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

☑ Change Catalog Description

From Applications of hydrology, fluid mechanics, bioprocessing, heat/mass transfer, instrumentation, mechanical unit operations and structural principles in design; project scheduling, cost estimation, ethics, environmental and social impacts, design drawings, and report documentation.

To Students will apply engineering knowledge to develop solutions to open-ended biosystems engineering problems. Designs will be evaluated by faculty and practicing engineers based on appropriate use of engineering principles, consideration of ecological, economic and societal impacts, and clear communication. Final presentation and report required.

Learning Objectives

Students will be able to:
- Identify key parameters and data that are needed for a specific design
- Search relevant literature to obtain needed information
- Formulate testing protocols to obtain information for design
- Incorporate key engineering science, engineering design, life science and sustainability concepts into the design to address problem
- Effectively communicate the design through oral presentation and written report.

Topical Outline

Week	Activity
1	Course introduction/brainstorming session!
2	Project work; Engineering design grading rubric
	Senior information (FE, Degree certification, jobs/grad school, NSF GRF)
3	Team member and project selection; Project work
4	Project work; Proposal Presentation
5	BE exams
6	Project work
7	Project work
8	Project work
9	Project work
10	Project work; Midterm presentation and report
11	Project work
12	Project work
	Fall Break
13	Project work

14 Project work; Thanksgiving break
15 Final presentation, Report and presentation with VO due

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Proposal presentation	10%
Midterm presentation/report	25%
Final presentation/report	40%
Hands-on component	5%
Video/Prezi/Powerpoint with voiceover	5%
Participation/Contribution to team	5%
BE exam	10%

Syllabus

Upload File: BE 4750 Syllabusv2-2017-20170217145524.pdf

Description: BE 4750 syllabus

Form

User ID: cdrapch **Name:** Caye Drapcho
Date: 02/17/2017 **Number:** 28452

Kevin Thomas Finneran Digitally signed by Kevin Thomas Finneran
Date: 2017.02.09 15:02:37 -05'00'

Chair, Department Curriculum Committee — Date

David L. Freedman
Digitally signed by David L. Freedman
DN: cn=David L. Freedman, o=Clemson University, ou=Environmental Engineering & Earth Sciences, email=dfreedm@clemson.edu, c=US
Date: 2017.02.10 00:40:59 -05'00'

Department Chair — Date

Christopher Kitchens — 2/17/2017

Chair, College Curriculum Committee — Date

Bradley Putman — 2/20/2017

College Dean — Date

Director, Calhoun Honors College — Date

John D. Wiffin — 3/3/2017

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Provost — Date

President — Date

BE 4750 Sec 001
Fall 2017
Biosystems Engineering Capstone Design 2 (0,6)

Lab: Mon and Wed 2:30 – 5:30 pm; 438 Brackett
Instructors: Dr. Caye M. Drapcho (primary), 441B Brackett Hall; cdrapch@clemson.edu
Dr. Terry Walker, 114 Biosystems Research Complex; walker4@clemson.edu
Office hours: **By *appointment***

Catalog statement: Students will apply engineering knowledge to develop solutions to open-ended biosystems engineering problems. Designs will be evaluated by faculty and practicing engineers based on appropriate use of engineering principles, consideration of ecological, economic and societal impacts, and clear communication. Final presentation and report required.

Prerequisite: CE 3410 with C grade or better: BE 3220 or BE 4380.

Course objectives (ABET student outcomes): To produce engineering graduates with the ability to analyze and design physical and biological systems, and to demonstrate that they have:

- the ability to design a system, component or process to meet desired needs
- the ability to identify, formulate, and solve engineering problems
- the ability to communicate effectively

Learning objectives:
Students will be able to:
- Identify key parameters and data that are needed for a specific design
- Search relevant literature to obtain needed information
- Formulate testing protocols to obtain information for design
- Incorporate key engineering science, engineering design, life science and sustainability concepts into the design to address problem
- Effectively communicate the design through oral presentation and written report.

Required textbook: none

Report submission:
All reports will be submitted through uploading of document to a BE 4750 Dropbox folder.

Grading:

Proposal presentation	10%
Midterm presentation/report	25%
Final presentation/report	40%
Hands-on component	5%
Video/Prezi/Powerpoint with voiceover	5%
Participation/Contribution to team	5%
BE exam	10%

Presentations information:
Three presentations will be given during the semester. The time allotted for presentations is shown below. Points will be deducted for every minute outside the allotted time per team.

Proposal presentations:	4 - 6 minutes per person
Midterm presentations:	5 minutes + 5 – 7 minutes per person
Final presentations:	5 minutes + 6 - 8 minutes per person

A group grade will be assigned for all elements on the rubric ***except*** *for the presentation quality points which will be assigned based on individual performance.*

Report information:
Two engineering reports will be prepared by each team during the semester. A group grade will be assigned to the reports.

Hands-on component:
Each project must demonstrate competency by including a hands-on component that can be achieved through fabrication of design, lab or field collection of data, or final testing of design.

Sustainability:
All projects will be evaluated with an emphasis on sustainability - How does your design achieve sustainability with respect to economic, ecological, and social considerations?

Video/Prezi/Powerpoint with voiceover
A ***short*** (4 - 5 minute total length) video or Powerpoint presentation **with voiceover** and **automatic slide advancement** must be developed to describe an overview of the project to the general public.

Participation/contribution to team
Each student will be assessed based on attendance and meaningful participation/contribution to the team.

BE exam
An open notes/book exam of BE concepts will be used to assess achievement of ABET outcomes. The areas covered will be: Thermodynamics (BE 3120), Geomatics (BE 3200); Watershed Hydrology (BE 3220); Biological Kinetics (BE 4100); Heat/Mass Transfer (BE 4120); Instrumentation (BE 4150); Bioprocess Engineering (BE 4380). The student grade will be the average of the highest four scores.

Final course grades will be assigned on the following basis:
A 90 - 100%; B 80 - 89%; C 70 - 79%; D 60 - 69%; F < 60%

University Policies:

1. Class attendance is expected. Students should wait 15 minutes for instructor to arrive.

2. Clemson University policies on academic integrity, as given below will be upheld in this course. Cheating on exams and quizzes, or plagiarizing in reports will not be tolerated. CU Academic Integrity Statement: "As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. When in the opinion of a faculty member, there is evidence that a student has committed an act of academic dishonesty, the faculty member shall make a formal written charge of academic dishonesty including a description of the misconduct, to the Dean of the Graduate School. At the same time, the faculty member may, but is not required to, inform each involved student privately of the nature of the alleged charge."

3. Office of Student Disability Services Statement: "It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities. Students are encouraged to contact Student Disability Services to discuss their individual needs for accommodation."

Course policies

1. All graded student work will be returned during class. *Students should keep track of their grades when the work is returned.* A Dropbox account will be used for file dissemination.
2. Students will form their own teams (3 - 4 students/team).
3. All projects must have a BE faculty advisor and may have an outside advisor.
4. All projects must be ***design*** projects and must include some portion of a hands-on component (fabrication or testing or field/lab data collection).
5. Each of these teams will have a small amount of funding to accomplish project tasks. A budget of $300/team is anticipated. (Note: this is *not* the budget for implementation of the project).

Potential projects

1. Clemson University campus stormwater management (2 areas of focus)
2. Resource recovery/fuel production from university food waste or other university waste
3. Clemson University or Lake Hartwell biological carbon capture/sequestration system
4. Passive solar designs retrofitted to SC mobile homes (with Sustainable Shed as model)
5. Oyster reef restoration for SC coastline
6. Biofuel, biomaterial or fermented product production from cull peaches
7. MFC design to power device from waste or sediments
8. Biodiesel production from rancid oils
9. Energy efficient calcium oxide production from egg shells
10. Others?

Course timeline:

Week	Activity
1	Course introduction/brainstorming session!
2	Project work; Engineering design grading rubric Senior information (FE, Degree certification, jobs/grad school, NSF GRF)
3	**Team member and project selection;** Project work
4	Project work; **Proposal Presentation**
5	BE exams
6	Project work
7	Project work
8	Project work
9	Project work
10	Project work; **Midterm presentation and report**
11	Project work
12	Project work
	Fall Break
13	Project work
14	Project work; *Thanksgiving break*
15	**Final presentation, Report and presentation with VO due**

18A

Change 4000/6000 Course

Change a Course

Subject: CPSC-Computer Science

Number: 4810/6810

Effective Term: Fall 2017

Title: Selected Topics

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201608

Brief Statement of Change Based on Assessment Results:
The current
title of CPSC 4810, "Selected Topics", does not convey that the course is intended for independent study. Furthermore, the current title is too similar to the title of CPSC 4820, "Special Topics in Computing", and confuses students in advising. A title change to "Independent Study" will better identify the purpose of the CPSC 4810 course.

☑ **Change Catalog Title**

From Selected Topics

To Independent Study

☑ **Change Transcript Title**

From Selected Topics

To Independent Study

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☑ **Other (Please specify.)**

Better describe purpose of course.

Learning Objectives

[Example of one instance on an independent study]
4000-Level Learning Outcomes 1. Compare and contrast forms of intellectual property (IP) protection 2. Explain the major provisions of the Digital Millennium Copyright Act (DMCA) and identify at least four issues that impact the home and workplace 6000-Level Learning Outcomes 1. Compare and contrast forms of intellectual property (IP) protection 2. Analyze the implications of the Digital Millennium Copyright Act (DMCA) on the home and workplace 3. Evaluate the limits of enforcement of end user license agreements (EULAs) based on case law

Topical Outline

[Example of one instance of an independent study]
1. Real vs. intellectual property (1 week) 2. Forms of intellectual property (IP) protection: copyright, patent, trade secret (3 weeks) 3. Advantages and disadvantages of the forms of protection (2 weeks) 4. Digital Millennium Copyright Act (DMCA) implications for home and workplace (5 weeks) 5. End-user license agreements (EULAs) (4 weeks)

Add course requirements for 6000-level courses

More rigorous learning
outcomes involving analysis and evaluation are defined as expectations for graduate students to succeed in the course, and an additional research paper is required for graduate students.

Evaluation

4000

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

[Example]
40% paper comparing and contrasting forms of IP protection. 40% paper on DMCA with identification of areas of impact for home and workplace, including guidelines on sharing music and videos. 20% Final exam.

6000

A	90	-	100
B	80	-	89
C	70	-	79

F < 70

[Example] 30% paper comparing and contrasting forms of IP protection. 30% paper on DMCA with analysis of implications on home and workplace, including research on whether these implications were considered by Congress when passing the DCMA. 30% paper evaluating the limits of enforcement of EULAs, with citation of court cases regarding EULAs. 10% Final exam.

Syllabus

Upload File: CPSC 4810 independent Study-20170210120606.docx

Description: syllabus

Form

User ID: mark **Name:** Mark Smotherman

Date: 02/10/2017 **Number:** 24716

2/10/17
Chair, Department Curriculum Committee Date

(for E. Kramer) 2/10/17
Department Chair Date

Christopher Kitchens 2/17/2017
Chair, College Curriculum Committee Date

Bradley Putman 2/23/2017
College Dean Date

Director, Calhoun Honors College Date

3/3/2017
Chair, Undergraduate Curriculum Committee Date

Chair, Graduate Curriculum Committee Date

Provost Date

President Date

CPSC 4810/6810 Independent Study

-- example syllabus for one possible instance of the course –

Intellectual Property Rights in Computing

4000-Level Learning Outcomes

1. Compare and contrast forms of intellectual property (IP) protection
2. Explain the major provisions of the Digital Millennium Copyright Act (DMCA) and identify at least four issues that impact the home and workplace

6000-Level Learning Outcomes

1. Compare and contrast forms of intellectual property (IP) protection
2. Analyze the implications of the Digital Millennium Copyright Act (DMCA) on the home and workplace
3. Evaluate the limits of enforcement of end user license agreements (EULAs) based on case law

Topical Outline

1. Real vs. intellectual property (1 week)
2. Forms of intellectual property (IP) protection: copyright, patent, trade secret (3 weeks)
3. Advantages and disadvantages of the forms of protection (2 weeks)
4. Digital Millennium Copyright Act (DMCA) implications for home and workplace (5 weeks)
5. End-user license agreements (EULAs) (4 weeks)

Meetings

The student is expected to make weekly appointments with the instructor for Q&A and to discuss progress.

Materials

- J. Boyle and J. Jenkins, Intellectual Property: Law and The Information Society, Center for the Study of the Public Domain, Duke University, 2014. Available online: http://web.law.duke.edu/cspd/pdf/IPCasebook2014.pdf.
- Other materials as appropriate and as found on your own.

Grading

- Undergraduate student taking CPSC 4810 – two papers are required:
  - 40% paper comparing and contrasting forms of IP protection
  - 40% paper on DMCA with identification of areas of impact for home and workplace. Include guidelines on sharing music and videos, e.g., when must YouTube take down a posted video?
  - 20% Final exam
- Graduate student taking 6810 – three papers are required:
  - 30% paper comparing and contrasting forms of IP protection
  - 30% paper on DMCA with analysis of implications on home and workplace. Should include research on whether these implications were considered by Congress when passing the DCMA or are examples of unintended consequences.

- 30% paper evaluating the limits of enforcement of EULAs. Cite court cases regarding which aspects of EULAs are typically enforced by the court system and which types of restrictions have been rendered unenforceable because of court decisions.
- 10% Final exam