

Cover Sheet: Request 13319

ABE 4XXX Control Methods in SmartAg Systems Course

Info

Process	Course New Ugrad/Pro
Status	Pending at PV - University Curriculum Committee (UCC)
Submitter	Thomas Burks tburks@ufl.edu
Created	11/6/2018 11:38:54 AM
Updated	2/12/2019 4:27:49 PM
Description of request	Applying for new course for the SmartAg Certificate

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	ENG - Agricultural and Biological Engineering 514907000	Kati Migliaccio		11/6/2018
No document changes					
College	Recycled	ENG - College of Engineering	Heidi Dublin	Department requested at 12/4 Curriculum Committee Meeting for this item to be tabled. Move back forward when ready.	12/10/2018
No document changes					
Department	Approved	ENG - Agricultural and Biological Engineering 514907000	Kati Migliaccio		12/11/2018
No document changes					
College	Recycled	ENG - College of Engineering	Heidi Dublin	Tabled by Department Rep pending adjustments that need to be made. See comments: Same comments from before, no changes were made to this undergrad request. The changes from the 13320 request need to be copied over. Difference between graduate and undergraduate courses needs to be explained better. It states in the form that advanced programming projects and term projects are not needed for undergraduates. But they are in the grading table. Do they do other projects?	1/9/2019
No document changes					
Department	Approved	ENG - Agricultural and Biological Engineering 514907000	Kati Migliaccio		1/24/2019
No document changes					

Step	Status	Group	User	Comment	Updated
College	Approved	ENG - College of Engineering	Heidi Dublin	Approved by HWCOE Curriculum Committee and at HWCOE Faculty Meeting	2/12/2019
ABE 4XXX HWCOE-Syllabus-Undergrad-Course-Spring-2020.docx					2/4/2019
ABE 5XXX HWCOE-Syllabus-Graduate-Course-Spring-2020.docx					2/4/2019
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			2/12/2019
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Course|New for request 13319

Info

Request: ABE 4XXX Control Methods in SmartAg Systems Course
Description of request: Applying for new course for the SmartAg Certificate
Submitter: Thomas Burks tburks@ufl.edu
Created: 2/4/2019 9:20:01 AM
Form version: 5

Responses

Recommended Prefix ABE
Course Level 4
Number XXX
Category of Instruction Advanced
Lab Code None
Course Title Control Methods in SmartAg Systems
Transcript Title Cntrl SmartAg Systems
Degree Type Baccalaureate

Delivery Method(s) On-Campus

Co-Listing Yes

Co-Listing Explanation Graduate students and Undergraduate students will complete four programming assignments during course that will cover similar lecture concepts but the degree of difficulty will be higher for graduate students. Also, graduate students will be required to complete a term paper and a term project covering more advanced programming concepts, and undergraduates will only be required to do a term paper.

Effective Term Earliest Available

Effective Year Earliest Available

Rotating Topic? No

Repeatable Credit? No

Amount of Credit 3

If variable, # min 0

If variable, # max 0

S/U Only? No

Contact Type Regularly Scheduled

Weekly Contact Hours 3

Course Description Design, analysis, simulation and programming modern control methods for applications in production agriculture, biological and food engineering, land and water resources. Students will learn theoretical concepts, application programming, and simulation techniques using classical and modern control approaches, fuzzy logic, neural networks and other intelligent learning algorithms.

Prerequisites MAP2302 Elementary Differential Equations or equivalent
PHY2048 Physics with Calculus

Co-requisites EGM 3400 Dynamics or equivalent

Rationale and Placement in Curriculum This is a required key course in the new SmartAg certificate program

Course Objectives • Gain ability to design, program, and analyze control systems, which can be applied to a broad range of engineering applications relevant to SmartAg systems including, but not limited to, field production, food processing, irrigation systems, and biological systems.

- Learn theoretical concepts associated with control system design using classical control and state space approaches, along with neural networks and fuzzy logic based solutions. Theory will be reinforced through homework, programming and term projects.

- Learn how to evaluate control oriented design problems, and formulate a solution. Students will develop a formal report and present concepts to class. Students will develop team skills and

communicate ideas in written and oral format. Projects will reinforce need for ethical design practices.

Course Textbook(s) and/or Other Assigned Reading • Modern Control Engineering
Ogata
2015, 5th Edition
ISBN: 978-9332550162

- Intelligent Control Design and Matlab Simulation
Jinkun Liu
2018, 1st Edition
ISBN: 978-9811052620

Weekly Schedule of Topics Week 1. Ogata-2: The Laplace Transform (Overview of Matlab)
Week 2. Ogata-3: Mathematical Modeling of Dynamic Systems
Week 3. Ogata-4: Mathematical Modeling of Fluid Systems
Week 4. Ogata-5: Transient and Steady State Response with Matlab
Week 5. Ogata-8: Frequency Response Analysis with Matlab
Week 6. Ogata-10: PID Control
Week 7. Ogata-11: Analysis of Control Systems in State Space with Matlab
Week 8. Ogata-12: Design of Control Systems in State Space with Matlab, (Mid-term Exam)
Week 9. Liu-3-4 :Foundations of Fuzzy Mathematics/Fuzzy Logic Control
Week 10. Liu-5 :Fuzzy Modeling and Control with Matlab
Week 11. Liu-6 :Adaptive Fuzzy Control
Week 12. Liu-7 :Neural Networks with Matlab
Week 13. Liu-8 :Adaptive Neural Network Control;
Week 14. Liu-9 :Discrete and Sliding Mode RBF Neural Networks
Week 15. Liu-10 :Intelligent Search Algorithms
Week 16. Final Exam

Links and Policies Excused absences must be consistent with university policies in the undergraduate catalog and require appropriate documentation.
(<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>)

More information on UF grading policy may be found at:
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal

penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:
<http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling.
<https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.

Grading Scheme

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (14)	100 each	20%

Programming/Simulation (4)	100 each	20%
Midterm Exam	100	25%
Final Exam	100	25%
Term Paper	100	10%
	100%	

Grading Policy

Percent Grade	Grade	Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

Instructor(s) Thomas F Burks

Control Methods in SmartAg Systems

ABE 4xxx Section 1234

Credits: 3

Class Periods: M and W, 8th and 9th Period, from 3:00PM to 4:55 PM

Location: 211 Rogers Hall

Academic Term: Spring 2020

Instructor:

Name: Tom Burks

Email Address: tburks@ufl.edu

Office Phone: (352) 392-1864, x225

Office Hours: By Appointment, Rogers Hall room 225

Teaching Assistants:

Please contact through the Canvas website

- TBD, Name of TA, email address, office location, office hours

Course Description

Design, analysis, simulation and programming modern control methods for applications in production agriculture, biological and food engineering, land and water resources. Students will learn theoretical concepts, application programming, and simulation techniques using classical and modern control approaches, fuzzy logic, neural networks and other intelligent learning algorithms. *Offered each spring*

Course Pre-Requisites

- MAP2302 Elementary Differential Equations or equivalent
- PHY2048 Physics with Calculus

Course Co-Requisites

- EGM 3400 Dynamics or equivalent

Course Recommendation

- Senior level engineering undergraduate student
- Fluent in general programming language such as C, C++, or Visual Basic, and MATLAB

Course Objectives

- Gain ability to design, program, and analyze control systems, which can be applied to a broad range of engineering applications relevant to SmartAg systems including, but not limited to, field production, food processing, irrigation systems, and biological systems.
- Learn theoretical concepts associated with control system design using classical control and state space approaches, along with neural networks and fuzzy logic based solutions. Theory will be reinforced through homework, programming and term projects.
- Learn how to evaluate control oriented design problems, and formulate a solution. Students will develop a formal report and present concepts to class. Students will develop team skills and communicate ideas in written and oral format. Projects will reinforce need for ethical design practices.

Materials and Supply Fees

Not Applicable

Professional Component (ABET):

This course contributes 3 credit hours toward meeting the minimum 48 credit hours of Engineering Topics in the basic-level curriculum for the Bachelor of Science Degree in Biological Engineering. Although not a required class, it is an engineering elective.

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
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	High
3. an ability to communicate effectively with a range of audiences	Low
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	Low
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	Medium
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Low
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Low

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not part of the course.

Required Textbooks and Software

- Modern Control Engineering
- Ogata
- 2015, 5th Edition
- ISBN: 978-9332550162

Recommended Materials

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Course Schedule

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Week 15. Liu-10: Intelligent Search Algorithms
Week 16. Final Exam

Attendance Policy, Class Expectations, and Make-Up Policy

- a) There will be approximately one homework assignment per week, due Monday before start of class. You may discuss homework with your classmates, but you may not copy verbatim from another student. Cheating will affect all parties involved. A scanned copy of homework will be turned in online in canvas with a one-day grace period at full points, zero percentage after that.
- b) Programming and simulation reports will be assigned on an approximate two to three week basis, examples will be used that are relevant to lecture material. All relevant project material, code, plots and write up will be submitted on line through canvas in a combined pdf file. While a copy of operational coding files will be emailed to instructor in native format, such as Matlab m-files that are ready to execute. There will be a one-day grace period with full points, and zero percentage after that.
- c) The term paper will more fully expose the students to the material covered in the class as applied to SmartAg applications. Students should choose topics that are relevant to their area of interest, and will be responsible to write a literature survey covering the selected topic. Assignments will be turned in online through canvas with a one-day grace period at full points, and zero percentage after that.
- d) Two exams, a mid-term and a final will be scheduled. Exams will be one-hour in duration, and closed book, though you will be allowed 1 page of notes on both front and back of an 8 in x 11.5 in sheet of paper. Cell phones, tablets, and laptops not permitted during exams.
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63.4 - 66.6	D	1.00
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<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

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ABE 5xxx Section 1234

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Email Address: tburks@ufl.edu

Office Phone: (352) 392-1864, x225

Office Hours: By Appointment, Rogers Hall room 225

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Course Recommendation

- Engineering graduate student
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Recommended Materials

Course Title, Prefix, and Number

Course Instructor and Academic Term

Page 1

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- The term paper will more fully expose the students to the material covered in the class as applied to SmartAg applications. Students will choose topics that are relevant to their area of interest and will be responsible to conduct a literature review of their topic and compose a paper reporting on said technology and how it is relevant to this class. Proper literary methods will be used to notate sources according to the assignment description. Assignments will be turned in online through canvas with a one-day grace period at full points, and zero percentage after that.
- The term project will be a more comprehensive programming assignment, only required of graduate students, that will more fully expose the students to the material covered in the class. The scope of the term project will be defined by instructor along with appropriate data sets and expected outcomes. Students will be responsible to design/conceive a SmartAg solution showing simulation program solutions to validate concept. Assignments will be turned in online through canvas with a one-day grace period at full points, and zero percentage after that.
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73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

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<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

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Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Course Title, Prefix, and Number

Course Instructor and Academic Term

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.