OFFICIAL UNDERGRADUATE COURSE OUTLINE (page 1)

COURSE IMPLEMENTATION DATE:	September 2014
COURSE REVISED IMPLEMENTATION DATE:	
COURSE TO BE REVIEWED: *(six years after UEC approval)*	September 2020 *(month, year)*

OFFICIAL UNDERGRADUATE COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.

Shaded headings are subject to change at the discretion of the department – see course syllabus available from instructor

ENGR 330	Physics	4
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV CREDITS

Automatic Control Systems

COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course is an introductory course on automatic control. The main goal of the course is to provide students with basic tools in modeling, analysis, and design for linear feedback control systems. Students will learn how to model mechanical, electrical, and electromechanical systems as differential equations and transfer functions. The analyses in this course include stability of open-loop and closed-loop systems as well as time responses and frequency responses of low order systems. The design methods are divided into root-locus techniques and frequency response techniques using Bode plots for designing proportional-integral-derivative (PID) and lead/lag controllers. Students will also learn how to apply automatic control theory to real engineering problems with Matlab and through laboratory exercises. This course will give the basic knowledge for more advanced control courses, such as state-space control techniques, nonlinear control, robust control, optimal control, adaptive control, digital control, sampled-data control, hybrid control, and system identification.

PREREQUISITES: ENGR 210
COREQUISITES:
PRE or COREQUISITES:

SYNONYMOUS COURSE(S):
(a) Replaces:
(b) Cross-listed with:
(c) Cannot take: for further credit.

SERVICE COURSE TO: *(department/program)*

TOTAL HOURS PER TERM: **75**

STRUCTURE OF HOURS:

Lectures:	**45**	Hrs
Seminar:		Hrs
Laboratory:	**30**	Hrs
Field experience:		Hrs
Student directed learning:		Hrs
Other (specify):		Hrs

TRAINING DAY-BASED INSTRUCTION:
Length of course:
Hours per day:

OTHER:
Maximum enrolment: **18**
Expected frequency of course offerings: annually
(every semester, annually, every other year, etc.)

WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	☐ Yes	☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)	☒ Yes	☐ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	☐ Yes	☒ No

Course designer(s):	**Xiaolin Long**		
Department Head:	**Derek Harnett**	Date approved:	**August 26, 2013**
Campus-Wide Consultation (CWC)		Date of meeting:	**June 28, 2013**
Curriculum Committee chair:	**David Fenske**	Date approved:	**September 20, 2013**
Dean/Associate VP:	**Lucy Lee**	Date approved:	**September 20, 2013**
Undergraduate Education Committee (UEC) approval		Date of meeting:	**October 25, 2013**

LEARNING OUTCOMES:

Upon successful completion of this course, students will be able to

- Model simple and complex electrical and electromechanical systems.
- Evaluate linear and non-linear models and analyze the relationship between their inputs and the outputs.
- Design PID controllers for electrical and electromechanical systems.
- Design feedback control systems and analyze their performance.
- Communicate effectively using both oral and written formats.
- Collaborate on projects in small teams.

METHODS: *(Guest lecturers, presentations, online instruction, field trips, etc.)*

Lectures, labs, presentations (oral and written)

METHODS OF OBTAINING PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

☒ Examination(s) ☐ Portfolio assessment ☐ Interview(s)

☐ Other (specify):

☐ PLAR cannot be awarded for this course for the following reason(s):

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]

Principles of Control Systems, H. Werner

SUPPLIES / MATERIALS:

The necessary laboratory equipment will be provided to the students.

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Assignments:	20%
Labs:	10%
Midterm exam:	25%
Final exam:	35%
Final project (written and oral presentations):	10%

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

1. Mathematical modeling of dynamic systems including transfer functions and state-space models
2. Transient response analysis of one-order and two-order systems
3. PID control theory
4. Stability analysis of open-loop and closed-loop systems