Office of the Registrar
FORM 40 REV. 11/09

PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

Print Form

EFD 26-10

DEPARTMENT School of Electrical and Computer Engineering (EFD 26-10) EFFECTIVE SESSION Fall 2011

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

- [ ] 1. New course with supporting documents
- [ ] 2. Add existing course offered at another campus
- [ ] 3. Expiration of a course
- [ ] 4. Change in course number
- [ ] 5. Change in course title
- [ ] 6. Change in course credit/type
- [ ] 7. Change in course attributes (department head signature only)
- [ ] 8. Change in instructional hours
- [ ] 9. Change in course description
- [x] 10. Change in course requisites
- [ ] 11. Change in semesters offered (department head signature only)
- [ ] 12. Transfer from one department to another

PROPOSED:	EXISTING:
Subject Abbreviation	Subject Abbreviation ECE
Course Number	Course Number 20100
Long Title Linear Circuit Analysis I	
Short Title Linear Circuit Analysis I	

Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

TERMS OFFERED
Check All That Apply:
[ ] Summer [ ] Fall [ ] Spring

CAMPUS(ES) INVOLVED
- [ ] Calumet
- [ ] Cont Ed
- [ ] Ft. Wayne
- [ ] Indianapolis
- [ ] N. Central
- [ ] Tech Statewide
- [x] W. Lafayette

CREDIT TYPE
1. Fixed Credit: Cr. Hrs. ____
2. Variable Credit Range: Minimum Cr. Hrs ____ (Check One) To [ ] Or [ ] Maximum Cr. Hrs. ____
3. Equivalent Credit: Yes [ ] No [ ]

COURSE ATTRIBUTES: Check All That Apply
- [ ] 1. Pass/Not Pass Only
- [ ] 2. Satisfactory/Unsatisfactory Only
- [ ] 3. Repeatable — Maximum Repeatable Credit: [ ]
- [ ] 4. Credit by Examination
- [ ] 5. Special Fees
- [ ] 6. Registration Approval Type — Department [ ] Instructor [ ]
- [ ] 7. Variable Title
- [ ] 8. Honors
- [ ] 9. Full Time Privilege
- [ ] 10. Off Campus Experience

ScheduleType	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated
Lecture				
Recitation				
Presentation				
Laboratory				
Lab Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
Prerequisites: ENGR 13100 and (PHYS 17200 or PHYS 15200) and (MA 16600 Minimum Grade of C- or MA 16200 Minimum Grade of C-) and (MA 26100 [may be taken concurrently] or MA 17400 [may be taken concurrently] or MA 18200 [may be taken concurrently] or MA 27100 [may be taken concurrently])
Restrictions: Must be enrolled in the College of Engineering.

*COURSE LEARNING OUTCOMES:
See attached

	Date		Date
Calumet Department Head		Calumet School Dean	
Fort Wayne Department Head		Fort Wayne School Dean	
Indianapolis Department Head		Indianapolis School Dean	
North Central Department Head		North Central Chancellor	
West Lafayette Department Head	3/30/11	West Lafayette College/School Dean	7/25/11

West Lafayette Registrar 8/19/11

OFFICE OF THE REGISTRAR

ECE 20100

TO: The Faculty of the College of Engineering

FROM: The Faculty of the School of Electrical and Computer Engineering

RE: Change to Existing Undergraduate Course: ECE 20100, change in requisites.

The faculty of the School of Electrical and Computer Engineering has approved the following changes to an existing course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

From: ECE 20100 Linear Circuit Analysis I
Sem. Fall, Spring, Summer; Cr. 3; Lecture 3.
Prerequisites: ENGR 12600 and (PHYS 17200 or PHYS 15200) and (MA 26100 [may be taken concurrently] or MA 17400 [may be taken concurrently] or MA 18200 [may be taken concurrently] or MA 27100 [may be taken concurrently])
Restrictions: Must be enrolled in one of the following: School of Electrical & Computer Engineering, School of Interdisciplinary Engineering, School of Mechanical Engineering, School of Nuclear Engineering, School of Agricultural and Biological Engineering, or School of Industrial Engineering.
Description: Volt-ampere characteristics for circuit elements; independent and dependent sources; Kirchhoff's laws and circuit equations. Source Transformations; Thevenin's and Norton's theorems; superposition, step response of 1st order (RC, RL) and 2nd order (RLC) circuits. Phasor analysis, impedance calculations, and computation of sinusoidal steady state responses. Instantaneous and average power, complex power, power factor correction, and maximum power transfer. Instantaneous and average power.

To: ECE 20100 Linear Circuit Analysis I
Sem. Fall, Spring, Summer; Cr. 3; Lecture 3.
Prerequisites: ENGR 13100 and (PHYS 17200 or PHYS 15200) and (MA 16600 Minimum Grade of C- or MA 16200 Minimum Grade of C-) and (MA 26100 [may be taken concurrently] or MA 17400 [may be taken concurrently] or MA 18200 [may be taken concurrently] or MA 27100 [may be taken concurrently])
Restrictions: Must be enrolled in the College of Engineering.
Description: Volt-ampere characteristics for circuit elements; independent and dependent sources; Kirchhoff's laws and circuit equations. Source Transformations; Thevenin's and Norton's theorems; superposition, step response of 1st order (RC, RL) and 2nd order (RLC) circuits. Phasor analysis, impedance calculations, and computation of sinusoidal steady state responses. Instantaneous and average power, complex power, power factor correction, and maximum power transfer. Instantaneous and average power.

Reason: Success in ECE 20100 requires a minimum level of mathematical competency that the faculty of the School of Electrical and Computer Engineering believes

necessitates that students obtain a grade of at least a C- in MA 16600 or MA 16200. This change was presented at a meeting of the Engineering advisors with no objections. ECE will grant the other engineering schools blanket permission to override the minimum grade requirement at their discretion. Also, the requisite of ENGR 12600 was changed due to the creation of ENGR 13100/13200.

Jeffrey L Gray

on behalf of V. Balakrishnan, Head
School of Electrical and Computer Engineering

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

ECC Minutes #17

Date 4/20/11

Chairman ECC R. Cipra

ECE 20100

Supporting Documentation EFD# 26-10

ECE 20100 - Linear Circuit Analysis I

Lecture Hours: 3.0 Credits: 3.0

Use towards *0* credit

Normally Offered: Each Fall, Spring, Summer

Requisites:
ENGR 13100 and (PHYS 17200 or PHYS 15200) and (MA 16600 Minimum Grade of C- or MA 16200 Minimum Grade of C-) and (MA 26100 [may be taken concurrently] or MA 17400 [may be taken concurrently] or MA 18200 [may be taken concurrently] or MA 27100 [may be taken concurrently])

Requisites by Topic:
Prerequisites: Two semesters of calculus; complex numbers; computer literacy and experience with MatLab or equivalent; some familiarity with vectors and matrices. Concurrent Prerequisites: Third semester of calculus.

Catalog Description:
Volt-ampere characteristics for circuit elements; independent and dependent sources; Kirchhoff's laws and circuit equations. Source transformation; Thevenin's and Norton's theorems; superposition. Step response of 1st order (RC, RL) and 2nd order (RLC) circuits. Phasor analysis, impedance calculations, and computation of sinusoidal steady state responses. Instantaneous and average power, complex power, power factor correction, and maximum power transfer. Instantaneous and average power.

Required Text(s):

1. *Linear Circuit Analysis: Time Domain, Phasor, and Laplace Transform Approaches*, 3rd Edition, R. DeCarlo and P. M. Lin, Kendall Hunt, 2009, ISBN No. 9780757564994.

Recommended Text(s):

1. *MatLab: Student Version*, Current Edition, The MathWorks, Inc..

Course Outcomes:

A student who successfully fulfills the course requirements will have demonstrated:

i. an ability to define and explain the meaning/function of charge, current, voltage, power, energy, R, L, C, the op amp, and the fundamental principles of Ohm's law, KVL and KCL.. [1,2; a]
ii. an ability to write the equilibrium equations for a given network and solve using appropriate software as needed for the steady state (dc and ac/phasor) solution.. [1,3,4; a,e,k]
iii. an ability to state and apply the principles of superposition, linearity, source transformations, and Thevenin/Norton equivalent circuits to simplify the analysis of circuits and/or the computation of responses.. [1,4; a,e,k]

iv. an ability to qualitatively predict and compute the step responses of first order (RL and RC) and second order (RLC) circuits.. [1,4; a,e,k]
v. an ability to qualitatively predict and compute the steady state ac responses of basic circuits using the phasor method.. [1,4; a,e,k]
vi. an ability to compute effective and average values of periodic signals and compute the instantaneous and average powers delivered to a circuit element.. [1,4; a,e,k]
vii. an ability to compute the complex power associated with a circuit element and design a circuit to improve the power factor in an ac circuit.. [1,4; a,e,k]
viii. an ability to determine the conditions for maximum power transfer to any circuit element.. [1,4; a,e,k]
ix. an ability to analyze resistive and RC op amp circuit and design simple amplifiers using op amps.. [1,3,4; a,e,k]

Assessment Method for Course Outcomes: none

Lecture Outline:

Lectures	Topic
3	General circuit element, charge, current; Voltage, sources, power; Resistance, Ohm's Law, power reprise, nonideal sources.
3	Kirchhoff's Laws, single loop/node circuits; R combinations, v & i division; Dependent sources (reprise).
3	Nodal analysis; Mesh analysis.
3	Op-amp basics; Superposition and linearity; Source transformations.
3	Thevenin's and Norton's Theorems; Maximum power transfer, D/A converter (optional).
3	Inductance;Capacitance; L and C combinations, duality.
3	Intro 1st order circuits; Source free/zero-input response; Step response.
3	Linearity (reprise)/Response classification; Further examples: Instabilities/Waveform generation; RC Op-amp circuits.
3	Intro 2nd order circuits: LC undamped case; Source free case: real characteristic roots; Source free case: complex roots.
3	2nd order circuits with constant inputs; Further examples/Applications (instr. Option); Sinusoidal forcing function.
3	Complex forcing function; Phasors, Ohm's Phasor law for R, L, & C, KVL & KCL; Impedance/admittance of 2-terminal devices.

3	Sinusoidal steady-state (SSS) analysis; Phasor diagrams; Frequency response.
3	Instantaneous and average power; Effective value; Complex power, conservation of power.
3	Power factor improvement; Maximum power transfer; Polyphase circuits.
3	Three exams for 1 week of testing over the semester.

ECE 20100

Form 40 attachment

School of Electrical and Computer Engineering (EFD 26-10)

Course Learning Outcomes:

i. an ability to define and explain the meaning/function of charge, current, voltage, power, energy, R, L, C, the op amp, and the fundamental principles of Ohm's law, KVL and KCL.. [1,2; a]
ii. an ability to write the equilibrium equations for a given network and solve using appropriate software as needed for the steady state (dc and ac/phasor) solution.. [1,3,4; a,e,k]
iii. an ability to state and apply the principles of superposition, linearity, source transformations, and Thevenin/Norton equivalent circuits to simplify the analysis of circuits and/or the computation of responses.. [1,4; a,e,k]
iv. an ability to qualitatively predict and compute the step responses of first order (RL and RC) and second order (RLC) circuits.. [1,4; a,e,k]
v. an ability to qualitatively predict and compute the steady state ac responses of basic circuits using the phasor method.. [1,4; a,e,k]
vi. an ability to compute effective and average values of periodic signals and compute the instantaneous and average powers delivered to a circuit element.. [1,4; a,e,k]
vii. an ability to compute the complex power associated with a circuit element and design a circuit to improve the power factor in an ac circuit.. [1,4; a,e,k]
viii. an ability to determine the conditions for maximum power transfer to any circuit element.. [1,4; a,e,k]
ix. an ability to analyze resistive and RC op amp circuit and design simple amplifiers using op amps.. [1,3,4; a,e,k]

i.