FAIRMONT STATE UNIVERSITY

MEMORANDUM

TO: Curriculum Committee

FROM: Jack Kirby

DATE: April 1, 2013

SUBJECT: Curriculum Proposal #12-13-61
AS Electronics Engineering Technology
Final Faculty Senate Approval 4/23/2013

I recommend approval of the attached Curriculum Proposal #12-13-61 from the College of Science and Technology, Department of Technology.

This proposal reduces the degree hour requirement for the AS in Electronics Engineering Technology from 72 to 60 hours and incorporates the new General Studies requirements.

c: Dr. Christina Lavorata
Dr. Anthony Gilberti
Mr. Larry Allen
Ms. Evie Brantmayer
Ms. Leslie Lovett

be First

CURRICULUM PROPOSAL
(Submit one hard copy and an electronic copy to the Associate Provost by the second Tuesday of the month.)

Proposal Number: 12-13-61

School/Department/Program: Science & Technology/Technology/Electronics Engineering Technology

Preparer/Contact Person: Larry Allen

Telephone Extension: 4631

Date Originally Submitted: Dec. 11,2012

Revision (Indicate date and label it Revision #1, #2, etc.):

Implementation Date Requested: Fall 2013

I. **PROPOSAL.** Write a brief abstract, not exceeding 100 words, which describes the overall content of the proposal.

This proposal includes the following modifications to the existing program:

1. *Deletion (from courses of instruction in the FSU catalog) of two ELEC courses. 2215 and 2220.*
2. *Removal of courses from other disciplines.*
3. *Creation of one new ELEC course; 2225.*
5. *Addition of courses from other disciplines.*
6. *Changes included in this proposal are designed to meet industry trends as identified by the program's Industrial Advisory Committee.*
7. *Adjustment of degree hours to meet the HEPC's 60 hour requirement.*
8. *Adjustment of curriculum to meet FSU's new general studies program.*
9. *Prerequisite changes to existing courses*

II. **DESCRIPTION OF THE PROPOSAL.** Provide a response for each letter, A-H, and for each Roman Numeral II–V. If any section does not apply to your proposal, reply N/A.

A. Deleted/Removed courses/credits from the program.

Course Number	Course Name	Credit Hours
DRAFT 1100	Engineering Graphics-course moved to Pierpont	
ELEC 2215	Basic Transistors –deleted	3
ELEC 2220	Linear Electronics-deleted	3
INFO 1100	Computer Concepts & Applications	3
MATH 1101	Applied Technical Math I	3
MATH 1102	Applied Technical Math II	3
TECH 2290	Engineering Analysis I	4
Total deleted hours		19

B. Created/Added courses/credits to the program.

Course Number	Course Name	Credit Hours
COMM 2202	Introduction to Communication in the World of Work	3
ELEC 2225	Electronics Devices-created	3
MATH 1185 or MATH 1190	Applied Calculus I or Calculus I	4
MATH 1186 or MATH 3315	Applied Calculus II or Calculus II	4
TECH 1108	Drafting Fundamentals	3
	Total added hours	17

C. Provision for interchangeable use of course(s) with program(s)
To successfully phase in the new courses, substitutions for deleted courses are indicated below.

Deleted Course	Interchangeable Course(s)	Implementation Date
ELEC 2215	ELEC 2225	Fall 2013
ELEC 2220	Advisor approved substitution	Fall 2014

D. Revision of course content. Include, as an appendix, a revised course description, written in complete sentences, suitable for use in the university catalog.

There are no course descriptions or credit hour revisions being proposed for current courses.

E. Other changes to existing courses such as changes to title, course number, and elective or required status.

Other than changes to prerequisites (see below in bold), there are no other changes to existing courses.

Prerequisite Changes:	
ELEC 2210 Circuit Analysis II	ELEC 1100 CR: **MATH 1186, MATH 3315 or ACT 24**
ELEC 2230 Digital Electronics	ELEC 2210, ~~ELEC 2215~~, **ELEC 2225**
ELEC 2240 Industrial Electronics	~~ELEC 2220~~, **ELEC 2225,** ELEC 2230, **ELEC 2250**
ELEC 2250 AC/DC Machinery/Cont.	ELEC 1100 **"C" in MATH 1186, or MATH 3315**
ELEC 2260 Communication Systems	**~~ELEC~~** ~~2220~~, **2225**, ELEC 2230

F. Creation of new course(s). For each new course

1. Designate the course number, title, units of credit, prerequisites (if any), ownership (FSU or shared) and specify its status as an elective or required course. If you are creating a shared course, attach a memo from the Deans of the affected Schools explaining the rationale for the course being shared.

   The table below indicates new course numbers, titles, credit hours, prerequisites, co-requisites, institution ownership, and course status.

Course Number	Title	Units of Credit (hrs)	Prerequisites	Co-requisites	Ownership	Status
ELEC 2225	Electronic Devices	3	ELEC 2200	ELEC 2210, MATH 1186 or MATH 3315 or ACT 24	FSU	required

2. Include, as an appendix, a course description, written in complete sentences, suitable for use in the college catalog.

   For a course description of ELEC 2225 see Appendix B.

3. Include, as an appendix, a detailed course outline consisting of at least two levels.

   For course outline of ELEC 2225 see Appendix C.

4. In order to meet the requirements as outlined in Goal One of the Strategic Plan, please include Outcome Competencies and Methods of Assessment as an appendix. Examples are available upon request from the Chair of the Curriculum Committee.

   For outcome competencies and methods of assessment for ELEC 2225 see Appendix D.

G. Attach an itemized summary of the present program(s) affected, if any, and of the proposed change(s).

Enrollment in classes may change due to the addition and deletion of courses. Those potentially affected courses are listed below.

Course added to Electronics program may see increase in enrollment.	Course removed from Electronics program may see decrease in enrollment.
COMM 2202	COMM 2200
MATH 1185	DRFT 1100
MATH 1186	ECON 2200
TECH 1108	INFO 1100
	MATH 1101
	MATH 1102
	TECH 2290

Describe how this proposal affects the hours needed to complete this program. Specifically, what is the net gain or loss in hours? Use the format for Current and Proposed Programs in Appendix A.

The current program requires 72 credit hours whereas the proposed program meets the 60 credit hour requirement.

III. RATIONALE FOR THE PROPOSAL.

A. **Quantitative Assessment**: Indicate the types of assessment data, i.e., surveys, interviews, capstone courses, projects, licensure exams, nationally-normed tests, locally developed measurements, accreditation reports, etc., that were collected and analyzed to determine that curricular changes were warranted. Quantitative data is preferred.

The Electronics Engineering Technology's Industrial Advisory Committee recommended combining ELEC 2215 & 2220. *This is reflected in the creation of the ELEC 2225 course.*

The reduction in hours is a response to the university's requirement for programs of study not to exceed 60credit hours.

B. **Qualitative Assessment**: Based upon the assessment data above, indicate why a curricular change is justified. Indicate the expected results of the change. Be sure to include an estimate of the increased cost, or reduction in cost of implementation. FOR EXAMPLE: Will new faculty, facilities, equipment, or library materials be required?

The principle reasons for the curriculum change is to meet the 60 credit hour requirement, align the program with the new General Studies program, and to address the emerging needs and trends in the electronics industry.

IV. Should this proposal affect any course or program in another school, a memo must be sent to the Dean of each school impacted and a copy of the memo(s) must be included with this proposal. In addition, the Deans of the affected schools must sign below to indicate their notification of this proposal.

By signing here, you are indicating your college's/school's notification of this proposal.

College/School	Dean	Signature
Science & Technology	Dr. Anthony Gilberti	
Liberal Arts	Dr. Deanna Shields	
Fine Arts	Dr. Peter Lach	

V. Should this proposal affect any course to be added or deleted from the general studies requirements, a memo from the chair of the General Studies Committee indicating approval of the change must be included with this proposal.

N/A

VI. ADDITIONAL COMMENTS.

APPENDIX A

A.S. Degree in Electronics Engineering Technology
Current Program

REQUIRED MAJOR COURSES			HRS
ELEC	1100	Circuit Analysis I	3
ELEC	2200	Shop Practices	3
ELEC	2210	Circuit Analysis II	3
ELEC	2215	Basic Transistors	3
ELEC	2220	Linear Electronics	3
ELEC	2230	Digital Electronics	3
ELEC	2240	Industrial Electronics	3
ELEC	2250	AC/DC Machinery & Controls	3
ELEC	2260	Communication Systems	3
ELEC	2270	Microcomputers	3
ELEC	2280	Programmable Controllers	3
DRFT	1100	Engineering Graphics	3
COMP	1101	Applied Tech Programming	3
MATH	1101	Applied Technical Math I	3
TECH	2290	Engineering Analysis I	4
ENGL	1109	Tech Report Writing	3
TOTAL REQUIRED MAJOR COURSE HOURS			**49**

GENERAL STUDIES COURSES		
ECON	2200	3
ENGL	1104	3
COMM	2200	3
MATH	1102	3
INFO	1100	3
PHYS	1101	4
PHYS	1102	4
TOTAL GENERAL STUDIES HOURS		**23**

TOTAL PROGRAM HOURS	72

A.S. Degree in Electronics Engineering Technology
Proposed Program

REQUIRED MAJOR COURSES		***HRS***
ELEC	*1100*	*3*
ELEC	*2200*	*3*
ELEC	*2210*	*3*
ELEC	*2225*	*3*
ELEC	*2230*	*3*
ELEC	*2240*	*3*
ELEC	*2250*	*3*
ELEC	*2260*	*3*
ELEC	*2270*	*3*
ELEC	*2280*	*3*
TECH	*1108*	*3*
COMP	*1101*	*3*
MATH	*1186 or 3315*	*4*
TOTAL REQUIRED MAJOR COURSE HOURS		***40***

REQUIRED GENERAL STUDIES COURSES			***HRS***
Attribute IB – Quantitative Literacy	*MATH*	*1185*	*4*
Attribute IC – Written Communication	*ENGL*	*1104*	*3*
Attribute IG – Oral Communication	*COMM*	*2202*	*3*
Attribute IV - Ethics	*COMM*	*2202*	*x*
Attribute V - Health	*Any approved course in V*		*2 or 3*
Attribute VIID – Natural Science	*PHYS*	*1101*	*4*
TOTAL GENERAL STUDIES HOURS			***16 OR 17***
FREE ELECTIVE			***3 - 4***

TOTAL PROGRAM HOURS	***60***

APPENDIX B

Course Descriptions

ELEC 2225 Electronic Devices **3 cr.**

Devices studied will include diodes, transistors, Op Amps, PLL's, and timers. The circuitry will include power supplies, basic amplifier types, power amplifiers, switching circuits, voltage regulators, comparators and active filters.
PR: ELEC 2200. CR: ELEC 2210, MATH 1186 or MATH 3315, or ACT 24

APPENDIX C

Course Outline

ELEC 2225 Electronic Devices

I. Diodes
   a. Diode Types and Characteristics
      i. Semiconductor Materials: Ge, Si, and GaAs
      ii. Covalent Bonding and Intrinsic Materials
      iii. Energy Levels
      iv. Extrinsic Materials: n-Type and p-Type
      v. Semiconductor Diode
      vi. Ideal Versus Practical
      vii. Resistance Levels
      viii. Diode Equivalent Circuits
      ix. Diode Specification Sheets
      x. Semiconductor Diode Notation
      xi. Diode Testing
      xii. Zener Diodes
      xiii. Light-Emitting Diodes

   b. Diode Applications
      i. Load-Line Analysis
      ii. Series Diode Configurations
      iii. Parallel and Series–Parallel Configurations
      iv. AND/OR Gates
      v. Sinusoidal Inputs; Half-Wave Rectification
      vi. Full-Wave Rectification
      vii. Zener Diodes
      viii. Practical Applications

II. Bipolar Junction Transistors
   a. Bipolar Junction Transistors
      i. Transistor Construction
      ii. Transistor Operation
      iii. Transistor Amplifying Action
      iv. Common-Emitter Configuration
      v. Limits of Operation
      vi. Transistor Specification Sheet
      vii. Transistor Testing
      viii. Transistor Casing and Terminal Identification

   b. DC Biasing-BJT's

i. Operating Point
ii. Fixed_Bias Configuration - Load-line
iii. pnp Transistors
iv. Transistor Switching Networks
v. Troubleshooting Techniques

III. Field-Effect Transistors
a. Field-Effect Transistors
i. Depletion-Type MOSFET
ii. Enhancement-Type MOSFET
iii. MOSFET Handling
iv. VMOS

IV. Frequency Response analysis
a. BJT and JFET Frequency Response
i. Logarithms
ii. Decibels
iii. General Frequency Considerations
iv. Normalization Process
v. Low-Frequency Analysis-Bode Plot
vi. Multistage Frequency Effects
vii. Square-Wave Testing

V. Operational Amplifiers
a. Operational Amplifiers
i. Differential Amplifier Circuit
ii. BiFET, BiMOS, and CMOS Differential Amplifier Circuits
iii. Op-Amp Basics
iv. Practical Op-Amp Circuits
v. Op-Amp Specifications-DC Offset Parameters
vi. Op-Amp Specifications-Frequency Parameters
vii. Op-Amp Unit Specifications
viii. Differential and Common-Mode Operation

b. Op-Amp Applications
i. Constant-Gain Multiplier
ii. Voltage Summing
iii. Voltage Buffer
iv. Controlled Sources
v. Instrumentation Circuits
vi. Active Filters

VI. Comparators
a. Linear-Digital ICs
i. Miscellaneous types
b. Comparators
i. Comparator Operation
ii. Hysteresis
iii. Applications

VII. Timers
a. Timer Operation
i. RC time constants
ii. Charging/discharging Calculations
b. The 555 IC timer
i. Astable operation
ii. Monostable operation

VIII. Phase-Locked Loops
- a. Voltage-Controlled Oscillator
  - i. Using 555
  - ii. The 556 VCO
- b. Phase-Locked Loop
  - i. The 565 PLL
  - ii. Setting up and testing PLL's

APPENDIX D

Outcome Competencies and Methods of Assessment

ELEC 2225 Electronic Devices

COURSE OUTCOME	ASSESSMENT METHOD
Demonstrate the ability to solve, build, and test for voltages, currents, gains, and impedances of the various op-amp models and configurations	Quizzes, exams, and lab experiments
Demonstrate the ability to solve, build, and test for voltages, currents, gains, of various diode and transistor circuits.	Exams and lab experiments
Demonstrate the ability to function as a member of a team.	Peer evaluation form
Demonstrate time management skills.	Success rate of completing labs within four hour segments
Demonstrate electronics solution for a calculus differentiator and integrator.	Lab