FAIRMONT STATE UNIVERSITY

MEMORANDUM

TO: Curriculum Committee

FROM: Jack Kirby

DATE: April 17, 2013

SUBJECT: Curriculum Proposal #12-13-58, REVISION #2
BS Civil Engineering Technology
Final Faculty Senate Approval 4/9/2013

I recommend approval of the attached REVISION #2 of Curriculum Proposal #12-13-58 from the College of Science and Technology, Department of Technology. This is the final draft of this proposal.

Fairmont State University is an equal opportunity, affirmative action institution.

FAIRMONT STATE UNIVERSITY

MEMORANDUM

TO: Curriculum Committee

FROM: Jack Kirby

DATE: March 28, 2013

SUBJECT: Curriculum Proposal #12-13-58, REVISION #1
BS Civil Engineering Technology

I recommend approval of the attached REVISION #1 of Curriculum Proposal #12-13-58 from the College of Science and Technology, Department of Technology. This proposal is now ready for Faculty Senate.

Fairmont State University is an equal opportunity, affirmative action institution

FAIRMONT STATE UNIVERSITY

MEMORANDUM

TO: Curriculum Committee

FROM: Jack Kirby

DATE: March 4, 2013

SUBJECT: Curriculum Proposal #12-13-58
BS Civil Engineering Technology

I recommend approval of the attached Curriculum Proposal #12-13-58 from the College of Science and Technology, Department of Technology.

This proposal reduces the BS in Civil Engineering Technology to 120 hours and implements the new General Studies requirements.

c: Dr. Christina Lavorata
Dr. Anthony Gilberti
Mr. James Vassil
Ms. Evie Brantmayer
Ms. Leslie Lovett

be First

Fairmont State University is an equal opportunity, affirmative action institution

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

Proposal Number: 12-13-58

School/Department/Program: College of Science and Technology, School of Technology, Civil Engineering Technology

Preparer/Contact Person: James Vassil

Telephone Extension: 4794

Date Originally Submitted:

Revision (Indicate date and label it Revision #1, #2, etc.): REVISION #2 04/17/2013

Implementation Date Requested: August 2013

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

Reduce required hours to 120 and conform to the new General Studies requirements. Add one credit to CIVL 4400, meet the WIC requirements and designate as the CET capstone course. Create a one credit hour introduction to CET course, CIVL 1100, similar to a freshman seminar.

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. Deletion of course(s) or credit(s) from program(s)
DRFT 2200 Introduction to CADD

Total hours deleted. 3

B. Addition of course(s) or credit(s) from program(s)

CIVL 1100 Introduction to Civil Engineering Technology (1 hour)
CIVL 4400 Highway Design 3 hours to 4 hours (add one hour)
TECH 1108 Engineering Graphics *refer to Proposal 12-13-54*

Total hours added. 5

C. Provision for interchangeable use of course(s) with program(s)

N/A

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

CIVL 4400, one credit added and capstone project included to meet ABET accrediting requirements; This course will also include a writing intensive component to meet university requirements. See appendix B

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

CIVL 4470, change in catalog description to reflect current course practices Appendix D

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.

CIVL 1100 Introduction to Civil Engineering Technology, 1-credit, CR-CIVL 2210, FSU owned course. This course will be required in the curriculum and will serve as a freshman seminar.

TECH 1108 is NOT a CIVL class, however, a syllabus has been provided in the appendix.

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

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

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.

See Appendix C

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

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.

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 Civil ET program is accredited by ETAC of ABET. The requirements of ABET warrant minor changes to the curriculum, most notably adding a designated capstone course. Other changes were a result of the effort to meet current university requirements for general studies.

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 rationale for adding CIVL1100 is to better prepare CET students for course work, continuing education, and requirements of Professional Engineers.

The one hour addition to the CIVL 4400 course provides the students a capstone experience integrated into the Highway design class. This will also meet the WIC requirements for the university. The capstone is a requirement for ABET accreditation.

The choice between taking PHYS II and CHEM II has been eliminated. The material covered in CHEM II is much more relevant to Civil ET and useful on the licensure exams.

The course description for CIVL 4470 will change to reflect current course structure and practices.

No new faculty, facilities, equipment or materials will be needed. The added course load will be handled by the existing CET faculty without causing overload.

The TECH 1108 course has been created by the TECH department to replace the Pierpont owned drafting course and allow the Civil ET program to asses outcomes for ABET accreditation.

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. Gilbert	C. A. Gilbert

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.

VI. ADDITIONAL COMMENTS.

New model schedule provided as Appendix D showing any prerequisite changes.

APPENDIX A

B.S. Degree in Civil Engineering Technology

Current Program

Required Major Courses			HRS
CIVL 2200		Intro to Surveying	3
CIVL 2210		Light Construction	4
CIVL 2220		Construction Materials	4
CIVL 2230		Construction Estimating	3
CIVL 2240		Land and Route Surveying	3
CIVL 2275		Civil Engineering Graphics	3
CIVL 2280		Environmental Engineering Technology I	3
CIVL 2290		Introduction to Structures	3
CIVL 3305		Hydraulics and Hydrology	3
CIVL 3340		Soil Mechanics	4
CIVL 4400		Highway Design	3
CIVL 4410		Advanced Structural Analysis	3
CIVL 4420		Construction Planning and Administration	3
CIVL 4440		Structural Design	3
CIVL 4460		Environmental Engineering Technology II	3
CIVL 4470		Advanced Soils and Foundations	3
DRFT 2200	Fundamentals of CADD	3	
ECON 2200	Economics	X	
ENGL 1109	Technical Report Writing	3	
MATH 1101	Applied Technical Math I	X	
MATH 1102	Applied Technical Math II	3	
TECH 2290	Engineering Analysis I	4	
TECH 3300	Engineering Analysis II	4	
CHEM 1101	Chemistry I	X	
CHEM 1102 or PHYS 1102	Chemistry II or Physics II	4	
PHYS 1101	Physics I	X	
MECH 1100	Statics	3	
MECH 2200	Strength of Materials	4	
MECH 3320	Dynamics	3	
TOTAL HOURS FOR MAJOR			**82**

Required General Studies Courses			
First Year Experience			15-16
ENGL	1104	Written English I	3
ENGL	1108	Written English II	3
INFO	1100	Computer Concepts and Applications	3
MATH			3-4
COMM	2200, 2201, OR 2202	Communication	3

Scientific Discovery	8
Cultural / Civilization Exploration	9
Society / Human Interactions	6
Artistic / Creative Expression	6
TOTAL GENERAL STUDIES HOURS	**44**
TOTAL FREE ELECTIVES	**2**
TOTAL HOURS	**128**

B.S. Degree in Civil Engineering Technology
Proposed Program

Required Major Courses		**HRS**
CIVL 1100	Introduction to Civil Engineering Technology	1
CIVL 2200	Intro to Surveying	3
CIVL 2210	Light Construction	4
CIVL 2220	Construction Materials	4
CIVL 2230	Construction Estimating	3
CIVL 2240	Land and Route Surveying	3
CIVL 2275	Civil Engineering Graphics	3
CIVL 2280	Environmental Engineering Technology I	3
CIVL 2290	Introduction to Structures	3
CIVL 3305	Hydraulics and Hydrology	3
CIVL 3340	Soil Mechanics	4
CIVL 4400	Highway Design	4
CIVL 4410	Advanced Structural Analysis	3
CIVL 4420	Construction Planning and Administration	3
CIVL 4440	Structural Design	3
CIVL 4460	Environmental Engineering Technology II	3
CIVL 4470	Advanced Soils and Foundations	3
TECH 1108	Engineering Graphics	3
MATH 1101	Applied Technical Math I	X
MATH 1102	Applied Technical Math II	3
TECH 2290	Engineering Analysis I	4
TECH 3300	Engineering Analysis II	4
CHEM 1101 or 1105	Chemistry I	X
CHEM 1102 or 2200	Chemistry II	4
PHYS 1101	Physics I	4
MECH 1100	Statics	X
MECH 2200	Strength of Materials	4
MECH 3320	Dynamics	3

TOTAL HOURS FOR MAJOR	**(X= GS course) 82**

Required General Studies Courses	
Attribute IA – Critical Analysis	3
MECH 1100	
Attribute IB – Quantitative Literacy	3
MATH 1101	
Attribute IC – Written Communication	3
ENGL 1104	
Attribute ID - Teamwork	X
CIVL 2200	
Attribute IE – Information Literacy	3
ENGL 1108	
Attribute IF – Technology Literacy	X
CIVL 2210	
Attribute IG – Oral Communication	3
COMM 2202	
Attribute III - Citizenship	3
HIST 1107 *or any course in Attribute III	
Attribute IV - Ethics	X
CIVL 4420	
Attribute V - Health	2
Any course in V	
Attribute VI - Interdisciplinary	3
GEOG 2210 *or any course in Attribute VI	
Attribute VIIA - Arts	3
Any course in VIIA	
Attribute VIIB - Humanities	III
HIST 1107 *or any course in Attribute VIIB	
Attribute VIIC – Social Sciences	3
ECON 2200	
Attribute VIID - Natural Science	4-5
CHEM 1101 or 1105	
Attribute VIII – Cultural Awareness	VI
GEOG 2210 *or any course in Attribute VIII	
Additional General Studies hours	X
TOTAL GENERAL STUDIES HOURS	**33-34**
TOTAL **TECHNICAL ELECTIVES	**3**
TOTAL FREE ELECTIVES	**1-2**
TOTAL HOURS	**120**

*These are recommended courses. Choosing a different course may result in more than 120 hours for graduation.

**Technical electives are listed in the appendix. These courses were chosen by the Civil ET Industrial Advisory Committee as classes that may help a graduate in the profession of Civil Engineering Technology

Appendix B CIVL 4400

CIVL 4400 – Highway Design and Transportation (WIC) – 4 Credits

This course addresses basic transportation theory and design, traffic flow, capacity analysis, level of service, flexible and rigid pavement design, and geometric design. A writing intensive capstone experience is included in this course, aligned with the general transportation planning model, which includes industry collaboration. PR: CIVL 3340, ENGL 1108, and one of the following: TECH 2290 or MATH 1185 or MATH 1190. Baccalaureate majors only.

Writing Intensive Component

Students will develop a technical report that includes four (4) intermediate checkpoints. This document will be generated throughout the semester with significant feedback given by the instructor at each checkpoint. In addition, feedback will be solicited by the executive board members of the American Association of Highway Engineers (ASHE), North Central WV (NCWV) Section.

The report shall contain the following: Memo Submittal, Executive Summary, Table of Contents, List of Figures and Tables, Report Body (significant technical content with many tables and figures), and a complete Appendix. The Appendix consists of a proposal of their time, along with time spent on each task thereafter, written surveys generated, and analysis and synthesis of the data collected.

The students will also have to orally defend the contents of this document twice, and respond to feedback received from their peers. Another writing module is the feedback they have to provide to their peers after each presentation. A third and final oral presentation will be given to the general members of ASHE NCWV Section for further critique, followed by a written reflection of the assignment. The writing component is well in excess of the twenty (20) required pages, and comprises 30% (or more) of the course grade.

The students are also required to generate their own notes in this course. This writing element is not turned in for a grade, but it is checked in class. Those with incomplete outlines are not permitted to sit in on that lecture, and they are marked absent. Excess of two absences results in a penalty.

The planned point structure for the overall course is as follows:

Three Exams @ 100 points/each	300
Quizzes & Professional Development	100
Comprehensive Final Exam	200
Capstone – Written	**300 – 30% of overall grade**
Capstone – Oral	100
TOTAL COURSE POINTS	**1,000**

Appendix C CIVL 1100

CIVL 1100 – Introduction to Civil Engineering Technology – 1 Credit

This course is designed to expose the students to the broad field of Civil Engineering Technology and the various options at their disposal during their academic tenure, and after graduation. It will explore the many design tools required, and writing techniques necessary to foster academic success, and provides an introduction to professional societies, internships, and students role as professionals in the work force. It is highly recommended students take this course freshman year. PR: None. CR: CIVL 2210.

Course Outline

i) Academic Introduction

   (a) Professional versus Technological course options

   (b) The many facets of Civil Engineering Technology

ii) Design Tools

   (a) Microsoft office packages: Word, Excel and Power point

   (b) Scales, Calculators, Dimensional Analysis, Problem Set up

iii) Technical Report Writing

   (a) Memos, abstracts, referencing & plagiarism

   (b) Technical report outlines and numbering systems

iv) Professional Roles

   (a) Fundamentals of Engineering Exam

   (b) Resumes and Internships

   (c) Professional Societies and Life Long Learning

Outcome Competencies and Methods of Assessment

At the end of this course, the student should be able to:

1. Select appropriate courses aligned with their career goals
2. Compare the various branches of Civil Engineering Technology
3. Demonstrate the use of Word, Excel and Power point
4. Apply the Engineers, Architect, and Metric Scales to drawings
5. Assess a problem based on dimensional analysis and logical steps
6. Prepare a memo and abstract
7. Create a list of references
8. Compile a technical report outline using an appropriate numbering system
9. Discuss the steps to becoming a professional engineer, and the requirements for qualifying for the fundamentals of engineering exam, along with the resources available for preparing for this exam.
10. Create a resume
11. Discuss professional societies and the need for life-long learning

Assessments will be conducted through homework assignments, quizzes, exams, and individual and small group projects. Some of the outcomes will be life lessons that can only be measured by tracking their progress throughout their tenure at Fairmont State University.

Appendix D CIVL 4470

Existing:

CIVL 4470 – Advanced Soil Mechanics and Foundation Design – 3 Credit

This course is a continuation of CIVL 3340 and includes shear strength, laboratory and field test methods and their use in design. It also provides an introduction to shallow and deep foundations, including bearing capacity and settlement analysis, the study of earth pressure for use in design of retaining walls, sheet piles, and excavation bracing, and an introduction to earth structure design and slope stability analysis. PR: CIVL 3340. Baccalaureate majors only.

Proposed:

CIVL 4470 – Advanced Soil Mechanics and Foundation Design – 3 Credit

This course is a continuation of CIVL 3340 and includes shear strength, laboratory and field test methods and their use in design. It also covers shallow and deep foundations, including bearing capacity and settlement analysis, the study of earth pressure for use in design and an introduction to slope stability analysis. PR: CIVL 3340. Baccalaureate majors only.

**Note the course outcomes did not change, only the catalog description.

Civil Engineering Technology

Model Schedule for Associate and Baccalaureate of Science Degree Programs

FRESHMAN

Semester 1		Semester 2	
CIVL 2210 Light Construction *(PR: NONE, CR: CIVL 1100)*	4	CIVL 2200 Intro. to Surveying *(PR: MATH 1101 or Math EQ)*	3
MATH 1101 Applied Tech. Math I *(See Notes on back for PR and Math EQ)*	3	**MATH 1102 Applied Tech. Math II *(PR: MATH 1101 with a "C" or better, or Math EQ)*	3
TECH1108 Engineering Graphics *(PR: NONE)*	3	ENGL 1108 Written English II *(PR: ENGL 1104 with a "C" or better)*	3
CIVL 1100 Intro to CET *(PR: NONE, CR: CIVL 2210)*	1	CIVL 2220 Construction Materials *(PR: CIVL 2210, MATH 1101 or Math EQ)*	4
ENGL 1104 Written English I *(See Notes on back for PR)*	3	MECH 1100 Statics *(CR: MATH 1102 or Math EQ)*	3
Total	*14*	*Total*	*16*

SOPHOMORE

Semester 3		Semester 4	
		CIVL 2230 Construction Est. *(PR: CIVL 2220)*	3
CIVL 2240 Const., Land & Rt. Survey *(PR: CIVL 2200)*	3	CIVL 2280 Environ. Eng. Tech I *(PR: CHEM 1101, CR: TECH 2290 or Math EQ)*	3
MECH 2200 Strength of Materials *(PR: MATH 1102 & MECH 1100 with a "C" or better in both)*	4	CIVL 2290 Intro. to Structures *(PR: MECH 2200)*	3
CHEM 1101 General Chemistry *(See Notes on back for PR)*	4	CIVL 2275 Civil Eng. Graphics *(PR: TECH1108)*	3
**TECH 2290 Engineering Analysis I *(Math 1102 with a "C" or better, or Math EQ)*	4	*COMM 2202 Comm - World of Work* *(PR: ENGL 1104 with a "C" or Better)*	*3*
Total	*15*	*Total*	*15*

Total =60 credits for the Associate of Science in Civil Engineering Technology Degree

JUNIOR

Semester 5		Semester 6	
CIVL 3305 Hydraulics & Hydrology *(PR: TECH 2290 or Math EQ, CIVL 2280)*	3	CIVL 4470 Adv.Soils / Foundations *(PR: CIVL 3340, BM Majors only)*	3
**TECH 3300 Eng. Analysis II *(PR: TECH 2290 with a "C" or better, or Math EQ)*	4	CIVL 4440 Structural Design *(PR: CIVL 2290)*	3
PHYS 1101 Intro. to Physics *(PR: See Notes on back)*	4	CHEM 1102 Chemistry II *(PR: CHEM 1101)*	4
CIVL 3340 Soil Mechanics *(PR: CIVL 2220, MECH 2200, TECH 2290 or Math EQ)*	4	ECON 2200 Economics *(PR: NONE)*	3
		TECHNICAL ELECTIVE *(See approved list)*	3
Total	*15*	*Total*	*16*

SENIOR

Semester 7		Semester 8	
CIVL 4410 Adv. Structural Analysis *(PR: TECH 3300 or Math EQ, CIVL 2290, Majors only)*	3	CIVL 4420 Const. Planning & Admin. *(PR: CIVL 2230)*	3
CIVL 4460 Environ. Eng. Tech II *(PR: CIVL 2280, TECH 3300 or Math EQ, Majors only)*	3	V Health and Well Being Elective	2
GEOG 2210 Intro to Geography *(PR: None)*	3	HIST 1107 US History I	3
VIIA Fine Arts Elective	3	CIVL 4400 Highway Design/Capstone *(PR: TECH 3300 or Math EQ, CIVL 3340, ENGL 1108)* *Majors only, Writing Intensive Course*	4
MECH 3320 Dynamics *(PR: MECH 1100, TECH 2290 or Math EQ)*	3		
		FREE ELECTIVE	2
Total	*15*	*Total*	*14*

Total =120 credits for the Bachelor of Science in Civil Engineering Technology Degree

**NOTE 1: To begin in Math 1101, you must have: 1) Completed one unit of high school algebra, AND 2) MATH scores of ACT 19, or SAT 460, or Compass 36, or, 3) Completed eight modules of MATH 0080.

PLEASE check your ACT/Compass scores. <u>You may NOT need to start with MATH 1101</u>! **Start in the highest math you qualify for!**

Advancing through the first three levels of Math require a "C" or better. Please consult the catalog for further information.

The Professional Track of Math Equivalents is suggested for those who want to go to graduate school and/or to better prepare themselves for the Fundamentals of Engineering Exam.

Math Equivalents (EQ) and other Professional Options		
CET Required Course	**Professional Track / Math EQ**	**Other options / Math EQ**
Math 1101		Math 1112: ACT 21 or SAT 500 or Compass 49
Math 1102		Math 1115: ACT 23 or SAT 540 or Compass 63
Tech 2290 – ACT 24 or SAT 560 or Compass 67, or Math 1102 or Math 1115 with a "C" or better	Math 1190 – Calculus I: ACT 25 or SAT 570 or Compass 73	Math 1185: Applied Calculus I ACT 24 or SAT 560 or Compass 67 Or Math 1115, or Math 1102 with a B or better
Tech 3300	Math 3315 – Calculus II	Math 1186: Applied Calculus II
	Math 3316 – Calculus III	
	Math 4401 – Differential Equations	
Chem 1101	Chem 1105 – See Catalog	
Chem 1102	Chem 1106 – See Catalog	
Physics 1101	Physics 1105 – See Catalog	

Note 2 - Pre-requisite for ENGL 1104: 1) A score of 18 on the ACT English Test, or 2) SAT Critical Reading – 450, or 3) 71 on the Compass Test, or 4) Successful completion of ENGL 0097.
A "C" in ENGL 1104 and 1108 is a graduation requirement for all BS degrees.

Note 3 – Pre-requisite for CHEM 1101: One year of high school algebra, AND, 1) Math scores of ACT 19, or SAT 460, or Compass 36, or 2) Successful completion of eight modules of Math 0080.

Note 4 – Pre-requisite for PHYS 1101: One year of high school Physics, or one year of high school trigonometry, or Math 1102 or Math EQ with a "C" or better.

<u>APPROVED TECHNICAL ELECTIVES</u>: ELEC 1101 Circuit Analysis I, SFTY 1100 Safety and Environmental Component of Industry, MANF 2205 Engineering Economy, MECH 2210 Thermodynamics I, MECH 2220 Fluid Mechanics, BUSN 1102 Introduction to Business, BUSN 2251 Corporate Communications, BUSN 3306 Business Law, PHIL 3325 Ethics, MATH 3316 Calculus III, MATH 3335 Probability and Statistics, MATH 4401 Differential Equations, ACCT 2201 Principals of Accounting I

- *Other by advisors consent only*
- *You may also use Technical Electives to satisfy the required credits if you start in a higher math.*

<u>OTHER</u>

1. It is the responsibility of the student to meet with the academic advisor to schedule all courses for the completion of these degrees.
2. To schedule hours above 18 per semester, the student must be graduating, or have at least a 3.0 average. Approval by the advisor and dean is required. To schedule hours above 21 per semester, approval from the provost is needed. Hours may not exceed 25 in any semester.
3. The semester before graduation, the student should schedule a Senior Evaluation through the Registrar's Office. The student must also apply for graduation at the Registrar's Office.
4. Exit interviews must be scheduled in your last semester with the Technology Office Assistant.