A 3-2 PROGRAM OF COLLEGIATE EDUCATION

in

PETROLEUM AND NATURAL GAS ENGINEERING

at

FORT VALLEY STATE UNIVERSTY FORT VALLEY, GEORGIA

AND

THE PENNSYLVANIA STATE UNIVERSITY UNIVERSITY PARK, PENNSYLVANIA

January 2007

A. INTRODUCTION

The faculties of the Cooperative Developmental Energy Program (CDEP) of Fort Valley State University (FVSU) and the College of Earth and Mineral Sciences of The Pennsylvania State University (PSU) agree to establish a collaborative educational program in Petroleum and Natural Gas Engineering in the Department of Energy and Geo-Environmental Engineering. Three years, or the equivalent, will be spent by a participating student at FVSU, where the student will study liberal arts, science, and mathematics. Upon satisfactory completion of the first three years at FVSU, the student will enter PSU and complete the Petroleum and Natural Gas Engineering BS major degree requirements. A successful completion of these programs will lead to an appropriate baccalaureate degree from each institution. Such a cooperative program is being created in an effort to fulfill the following objectives:

- i. To cooperatively provide a general education in liberal arts and sciences, as well as petroleum and natural gas engineering education for each student enrolled, so that through approximately five years of study, a student may complete a program of study that otherwise could require six or more years.
- ii. To enable qualified students who otherwise would have limited access to receive superior training in the liberal arts, basic sciences, and advanced petroleum and natural gas engineering, and in so doing, provide the Nation with a group of exceptionally well-educated petroleum and natural gas engineers, who will be prepared to meet new challenges in the realms of industry and research.

B. PROCEDURES

Counseling, admission and the transfer of students in this 3-2 cooperative program will be through the application of the following procedures and policies:

- 1. Application for admission to the program will be made to FVSU, where the candidate will be subject to the admission requirements of that institution. An individual who has been registered as a degree candidate and established a degree candidate record at PSU prior to entering the 3-2 program at FVSU will be considered a reenrollment candidate and must meet the criteria for re-enrollment in the major at PSU.
- 2. A student will indicate the desire to follow the 3-2 program either at the time of the student's admission to FVSU, or early enough in the student's program to permit the student to complete as many of the suggested prerequisite courses, listed in the Appendix of this contract, as possible. Results from aptitude and achievement tests, records of scholastic achievement, and other pertinent information will be exchanged between institutions to aid both in guiding and in counseling students and prospective students.

FVSU is responsible for informing students in the 3-2 program of the requirements for admission to PSU, as described in this document and is encouraged to provide each student with a copy of this contract. Students should also be made aware of the courses that are available at FVSU that can be used to meet degree requirements for the Petroleum and Natural Gas Engineering BS major. To that end, students should be provided with a copy of the Appendices to this contract.

- 3. Each Fall semester (or term), the 3-2 program coordinator at FVSU shall provide the Dean's Office of the College of Earth and Mineral Sciences at PSU with a list of students at FVSU who have indicated their desire to participate in the 3-2 program.
- 4. At the end of the first (Fall) semester of the third year at FVSU, a student becomes a <u>candidate</u> for transfer <u>if</u> the student has completed the entrance-to-major course requirements and has attained a cumulative grade point average of 3.00 (on a 4.00 scale) or greater. In all cases, the cumulative grade point average that will be used to determine eligibility will be calculated by the method used at PSU. Original grades for courses that were repeated along with grades for the same courses that were repeated will be used in the calculation. FVSU may require higher academic standards for transfer.
- 5. The student should submit an application (available on the Web) to the Admissions Office of PSU no later than February 1 of the applicant's third year at FVSU. FVSU students will apply for advanced standing rather than as first-year students. The application should clearly indicate that the student is applying as a 3-2 student. The completed application should be supported by the following documents:
 - a) Final high school record
 - b) Two copies of the official FVSU transcript, including grades earned through the Fall Semester of the third year
 - c) Schedule of courses for the Spring of the third year
 - d) Check list (see Appendices) of the courses taken and those planned for the Spring of the third year at FVSU.

The application and supporting documents will be evaluated by the appropriate officer in the Admissions Office and the Dean's Office of the College of Earth and Mineral Sciences at PSU. If the applicant meets the entrance requirements, the applicant will be offered provisional admission to PSU in the 3-2 program, commencing with the following summer session or fall semester.

At the completion of the third year, two copies of the final official transcript of courses taken at FVSU should be forwarded to the PSU Admissions Office. The applicant's admission to PSU will be changed from a provisional basis to a permanent basis if the student has maintained the grade point average required for the major, and has fulfilled any conditions that may have been specified in the student's provisional admission. A minimum of 70 and 73 transferable and applicable credits in chemistry and mathematics programs, respectively must be completed at FVSU. Under normal circumstances, failure to meet the conditions of provisional admission will result in the voiding of the offer of admission for the student and in his or her ineligibility to participate in the 3-2 program.

- 7. The suggested FVSU courses in geology, physics, biology, mathematics, chemistry, computer science, liberal arts, and communications are shown in the Appendices. Appendix A is a checklist of FVSU classes (and their PSU equivalents) required for the Chemistry-Petroleum and Natural Gas Engineering program: Appendix B is a checklist of classes for the Math-Petroleum and Natural Gas Engineering program. The FVSU courses that fulfill requirements for the PSU Petroleum and Natural Gas Engineering BS degree are indicated by asterisks on the checklists. Course numbers and descriptions may change by the actions of the FVSU faculty or PSU faculty. In such cases, the Appendix only would need to be amended. FVSU will receive regular updates about changes at PSU and will be expected to regularly inform PSU of changes at FVSU, as they relate to the 3-2 program. Students must bring a completed checklist (Appendix A or B) with them for their first meeting with their PSU faculty advisor.
- 8. The Department of Energy and Geo-Environmental Engineering faculty at PSU are responsible for providing guidance and access to a sequence of Petroleum and Natural Gas Engineering classes, and supporting

engineering sciences and basic sciences if necessary, in order to complete the requirements for the Petroleum and Natural Gas Engineering BS degree in a two year period. Appendix C shows a possible sequence of courses that would fulfill the PSU Petroleum and Natural Gas Engineering BS degree program for students pursuing the Chemistry - Petroleum and Natural Gas Engineering dual degree program; Appendix D shows the course sequence for students pursuing the Mathematics - Petroleum and Natural Gas Engineering program. Appendix E shows the list of PSU courses that FVSU students will be required to take during their studies at Penn State. All participating students will have access to merit-based scholarships awarded by PSU Department of Energy and Geo-Environmental Engineering, the academic home of the Petroleum and Natural Gas Engineering program. All participating students will continue to receive merit-based scholarships awarded by PSU Department of Energy and Geo-Environmental Engineering as long as they carry the required semester course load and maintain a cumulative GPA of 3.00 or greater. Transferring students whose GPAs fall below 3.00, but not less than 2.50 at the end of their first semester of attendance, will continue to receive scholarships the following semester on a probationary status. If the student's cumulative GPA is below 3.00 by the end of the second semester, PSU Department of Energy and Geo-Environmental Engineering is no longer obligated to provide that student with a merit-based scholarship. Participating students will also have equal access to collaborative research projects with PSU Department of Energy and Geo-Environmental Engineering faculty and graduate students.

- 9. The Department of Energy and Geo-Environmental Engineering faculty at PSU are responsible for providing guidance regarding application to graduate programs in Petroleum and Natural Gas Engineering and related disciplines, both at PSU and elsewhere, according to the students' interests. Students pursuing either of the dual-degree programs may, at the end of their first year at PSU, apply for the PSU Petroleum and Natural Gas Engineering BS-MS program, which would lead to a MS degree in Petroleum and Natural Gas Engineering after completion of all requirements specified in the BS-MS program, which would normally take an additional year.
- 10. PSU Department of Energy and Geo-Environmental Engineering faculty will conduct yearly interviews with participating students in order to guide adjustments to the way the program is carried out.
- 11. This agreement shall be reviewed on a 5-year cycle. As part of the review process, attention will be paid to the total number of students that participate in the program from FVSU. A lack of response to requests for information and lack of adequate participation may result in termination of the agreement.

Robert Crane Associate Dean

College of Earth and Mineral Sciences

The Pennsylvania State University

2/6/07 Date

2/5/07 Date

Vice President and Dean for Undergraduate Education

The Pennsylvania State University

Associate Vice President for Collaborative Programs, Director of CDEP

Fort Valley State University

Appendix A: Checklist for Chemistry-Petroleum and Natural Gas Engineering Program

3-2 Dual Degree Program: Chemistry BS from FVSU, Petroleum and Natural Gas Engineering BS from PSU

Asterisk indicates course required for PSU Petroleum and Natural Gas Engineering BS

Penn State Course	Credits	PSU Course Title	FVSU Course	Credits	Grade
CHEM 12*	3	Chemical Principles I	CHEM 1211K	4	
CHEM 14*	1	Experimental Chemistry	CHEM 1211K	L	
CHEM 13*	3	Chemical Principles II	CHEM 1212K	4	:
CHEM 15	1	Experimental Chemistry	CHEM 1212K	L	
¹ CHEM 34*	3	Organic Chemistry I	CHEM 2221K	4	
¹ CHEM 35*	3	Organic Chemistry II	CHEM 2222	4	
CHEM 36	2	Org. Chem. Lab	CHEM 2221K	L	
CHEM 410	3	Adv. Inorganic Chemistry	CHEM 3310	3	
CHEM 425	3	Chromat, & Clectrochem	CHEM 3341K	4	
CHEM 426	3	Chem. Spectroscopy	CHEM 3342K	4	
CHEM 400	1	Chem. Literature (1)	CHEM 4210	1	i
CHEM 451	3	Phys. Chem. I (3)	CHEM 4331K	3	
CHEM 452	3	Phys. Chem II(3)	CHEM 4332K	3	
CHEM 489	1 to 10	Intro. Chem Research	CHEM 4450	2	
	1 10 10	mare. ement resourch	0/12/11 4400		
MATH 140*	4	Calculus & Analytic Geometry I	MATH 1154	4	
MATH 141*	4	Calculus & Analytic Geometry II	MATH 2164	4	
MATH 230*	4	Calculus & Vector Analysis	MATH 2174	4	
² STAT 200	4	Elementary Statistics	² MATH 2113	3	
² MATH 251*	4	Differential Equations	² MATH 3223	3	
-					
PHYS 211*	4	General Physics (Mechanics)	PHYS 2211K	4	
PHYS 212*	4	Gen. Physics (E&M)	PHYS 2212K	4	
BIOL 110	4	Intro Biology	¹ BIOL 1107K	4	
ENGL 015*	3	Rhetoric & Composition	ENGL 1101	3	
CAS 100"	3	Effective Speech	COMM 1110	3	
		Effective Writing: Technical			
ENGL 202C*	3	Writing	ENGL 1102	3	
3Arts Elective*	3	Architecture, Art History, Integrative Arts,	MUSC 1000		
Ans Elective	3	Landscape Architecture, Music, Theatre Arts	A DTL 1000		
	 	American Studies, Classics,	ARTH 1000		
	3	History, Humanities,	HIST 1111(world hist)	3	
		1	⁴ ENGL 2111(world		
3.5 Humanities Elective*	3		lit.)	3	
	Ì				
		Multi-Ethnic Studies,			
	3	Philosophy, Religious Studies	HIST 2111(US hist)	3	
	1		DOLG 4494/119	_	
360	}		POLS 1101(US govt)	3	
^{3 6} Social & Behavioral Science Elective*	3		PYSC 1101 (gen	3	
	"	Anthropology, Human	psyc) SOCI 2008(cult	3	
	3	Development, Political Science, Psychology, Sociology	divers)	2	
Health & Physical Activity*	<u> </u>	r sychology, Sociology	PEDW	1	
		Various Physical Activity		,	
	3	Courses	7 PEDW	1	
			7 PEDW	1	!
GEOSC 001*	3	Intro Physical Geol.	GEOL 1121	4	
GEOSC 021	3	Intro Earth History	GEOL 1122	4	-
GEOSC 201	4	Mineralogy and Petrology	GEOL 2204	4	
GL030 201	<u> </u>	I will let alogy and recougy	J GEOL 2204	4	L

[≃] course required for PSU Petroleum and Natural Gas Engineering BS degree

NOTES:

- 1. These 6 credits of Organic Chemistry courses can be used to fulfill Penn State's technical elective
- 2. MATH 2113 and MATH 3223 of FVSU will be used to fulfill PSU's MATH 251 requirement
- 3. The 18 total credits of Arts, Humanities, and Social Science Electives can occur in a 6-6-6- or 3-6-9 credit distribution.
- 4. Either of these satisfies the PSU Intercultural & International Competence requirement; the US Cultures requirement will be waived in view of the FVSU experience
- 5. Other FVSU courses may apply to this category, but one course has to be in the area of ethical issues in science and/or engineering
- 6. Other FVSU courses may apply to this category, but one course has to be in microeconomics
- 7. Any combination of 1 or 2 credit PEDW classes that totals 3 credits will suffice in this category

Appendix B: Checklist for Math-Petroleum and Natural Gas Engineering Program

3-2 Dual Degree Program: Mathematics BS from FVSU, Petroleum and Natural Gas Eng. BS from PSU

Asterisk indicates course required for PSU Petroleum and Natural Gas Engineering BS

MATH 140" STAT 200 4 Calculus & Analytic Geometry Elementary Statistics Problem Solving MATH 2113 3 MATH 2113 3 MATH 2111 11 MATH 311W 3 MATH 220 4 MATH 250 4 MATH 250 3 MATH 250 4 MATH 250 3 MATH 250 3 MATH 250 3 MATH 250 3 MATH 265 3 MATH 265 3 MATH 426 3 MATH 426 3 MATH 426 3 MATH 427 4 MATH 277 4 MATH 273 3 MATH 427 3 MATH 428 3 MATH 429 3 MATH 413 3 MATH 427 4 MATH 251 4 MATH 251 4 Differential Equations MATH 413 3 MATH 427 MATH 251 4 Differential Equations MATH 413 3 MATH 428 3 MATH 414 3 MATH 429 PMATH 318 3 Probability MATH 3373 3 MATH 405 3 Advanced Calculus MATH 439 MATH 439 MATH 439 3 MATH 439 MATH 439 3 MATH 439 MATH 4	Penn State Course	Credits	PSU Course Title	FVSU Course	Credits	Grade
STAT 200	MATH 140*	,	Calculus & Analytic Geometry	MATH 1154	4	
MATH 141" 4	Į.)		l l		
MATH 141* 4 Calculus & Analytic Geometry II Discrete Math MATH 2164 4 MATH 230* 4 Discrete Math MATH 2273 3 *MATH 220* 4 Calculus & Vector Analysis MATH 2174 4 *MATH 265 3 Number Theory MATH 2203 3 MATH 426 3 Adv. Geometry MATH 3273 3 MATH 427 3 Adv. Geometry MATH 3233 3 MATH 428 3 Adv. Geometry MATH 3233 3 MATH 413 3 Comptex Analysis MATH 4193 3 *MATH 414 3 Comptex Analysis MATH 4193 3 *MATH 318* 3 Porbability *MATH 4390 2 *MATH 405* 3 Advanced Calculus *MATH 4391 1 MATH 405* 3 Advanced Calculus *MATH 4391 1 MATH 4391 1 MATH 4391 1 MATH 4392 3 Fortran CSCI 3332 3 CMPSC 2016* </td <td>31A1 200</td> <td>~ </td> <td>·</td> <td>1</td> <td>-</td> <td>l</td>	31A1 200	~	·	1	-	l
MATH 311W 3 Discrete Math MATH 2253 3 MATH 230 4 Calculus & Vector Analysis MATH 274 4 MATH 220 2 Mathress 'MATH 2203 3 MATH 436 3 Linear Algebra II MATH 24243 3 MATH 426 3 Adv. Geometry MATH 3323 3 MATH 427 3 Adv. Geometry MATH 3323 3 MATH 427 4 Differential Equations MATH 4193 3 MATH 2511 4 Differential Equations MATH 3223 3 MATH 4051 3 Probability *MATH 3373 3 *MATH 4051 3 Advanced Calculus *MATH 3373 3 MATH 4051 3 Advanced Calculus *MATH 4391 1 MATH 4051 3 Advanced Calculus *MATH 4393 3 MATH 4051 3 Fortran CSCI 3332 3 CMPSC 2016 3 Chix CSCI 3332 3 CMPS 2111			Problem Solving	WATH 1201	' '	
MATH 230" 4	MATH 141*	4	Calculus & Analytic Geometry II	MATH 2164	4	
MATH 220	MATH 311W	3	Discrete Math	MATH 2253	3	
MATH 465 3 Number Theory MATH 3273 3 MATH 426 3 Linear Algebra II MATH 4243 3 MATH 425 3 Adv. Geometry MATH 3323 3 MATH 415 3 Abstract Algebra MATH 4193 3 MATH 415 3 Complex Analysis MATH 4143 3 MATH 418 3 Complex Analysis MATH 4143 3 MATH 405* 3 Advanced Calculus MATH 4390 2 PATH 405* 3 Advanced Calculus AMATH 4343 3 MATH 405* 3 General View of Math MATH 4391 1 CMPSC 2016* 3 Fortran CSCI 3332 3 CMPSC 2016 3 Chixic CSCI 3331 3 PHYS 211* 4 General Physics (Mechanics) PHYS 2211K 4 PHYS 212* 4 General Physics (Mechanics) PHYS 2211K 4 PHYS 211* 4 General Physics (Mechanics) PHYS 2211K 4 <td>MATH 230*</td> <td>4</td> <td>Calculus & Vector Analysis</td> <td>MATH 2174</td> <td>4</td> <td></td>	MATH 230*	4	Calculus & Vector Analysis	MATH 2174	4	
MATH 436 3	¹ MATH 220	2	Matrices	¹ MATH 2203	3	
MATH 426 3 Adv. Geometry MATH 3323 3 MATH 411 3 Complex Analysis MATH 4193 3 MATH 411 3 Complex Analysis MATH 4193 3 MATH 4511* 4 Differential Equations MATH 4390 2 Phobability Photal Th 3373 3 PATH 405* 3 Advanced Calculus AATH 4343 3 MATH 405* 3 Advanced Calculus MATH 4391 1 MATH 405* 3 General New of Math MATH 3393 3 CMPSC 2016* 3 Fortran CSC13332 3 CMPSC 2016* 3 UnixiC CSC13332 3 CMPSC 2016* 3 Cherical Principles I CSC13332 3 CMPSC 2016* 3 Cherical Principles I CHEM 1211K 4 CHEM 121* 4 General Physics (Mechanics) PHYS 2212K 4 CHEM 121* 1 Experimental Chemistry CHEM 1211K 4 CHEM 12*	MATH 465	3	Number Theory	MATH 3273	3	
MATH 435 3 Abstract Algebra Complex Analysis MATH 4193 3 MATH 4193 3 MATH 4143 3 "MATH 251" 4 Differential Equations MATH 4193 3 MATH 4251" 4 Differential Equations MATH 4390 2 "MATH 3283 3 MATH 4390 2 "MATH 4390 2 "MATH 4390 2 "MATH 4390 2 "MATH 4390 3 MATH 4493 3 MATH 4391 1 MATH 4391 3 MATH 4391 3 MATH 4391 1 MATH 4391 3 MATH 4391 3 MATH 4391 1 MATH 3393 3 CMPSC 2016" 3 General Wew of Math MATH 3393 3 CMPSC 2016 3 Unix/C CSCI 3332 3 CMPSC 2016 3 Unix/C CSCI 3332 3 CMPSC 2016 3 Unix/C CSCI 3332 3 CMPSC 2016 3 Chemical Principles I CHEM 1211K 4 CHEM 121" 4 Gen. Physics (Mechanics) PHYS 2211K 4 PHYS 212" 4 Gen. Physics (Mechanics) PHYS 2211K 4 PHYS 212" 4 Gen. Physics (Mechanics) PHYS 2211K 4 CHEM 121 CHEM 13" 3 Chemical Principles II CHEM 1211K L CHEM 141 The Experimental Chemistry CHEM 121K L CHEM 121 CHEM 13" 3 Chemical Principles II CHEM 1211K L CHEM 121 CH	MATH 436	3	Linear Algebra II	MATH 4243	3	
MATH 41	MATH 426	3	Adv. Geometry	MATH 3323	3	
MATH 2511	MATH 435	3	Abstract Algebra	MATH 4193	3	
Math Review	MATH 41	3	Complex Analysis	MATH 4143	3	
2MATH 318* 3 Probability 2MATH 3373 3 2MATH 405* 3 Advanced Calculus 2MATH 4343 3 MATH 905* 3 General View of Math MATH 4391 1 MATH 395 3 General View of Math MATH 3993 3 CMPSC 201C 3 Fortran CSCI 3332 3 CMPSC 201C 3 Unix/C CSCI 3332 3 PHYS 211* 4 General Physics (Mechanics) PHYS 221K 4 PHYS 212* 4 Gen. Physics (E&M) PHYS 221K 4 CHEM 12* 3 Chemical Principles I CHEM 121K 4 CHEM 13* 3 Chemical Principles II CHEM 121K L CHEM 13* 1 Experimental Chemistry CHEM 121K L CHEM 14* 1 Experimental Chemistry CHEM 121K L CHEM 121K 1 Experimental Chemistry CHEM 121X L BIOL 110 4 Intro Biology BIOL 1107K 4	1MATH 2511	4	Differential Equations	¹ MATH 3223	3	
2MATH 405* 3 Advanced Calculus Math Seminar 2MATH 4343 3 MATH 035 3 General View of Math MATH 3991 1 CMPSC 201F* 3 Fortran CSCI 3332 3 CMPSC 201C 3 Unix/C CSCI 3332 3 PHYS 211* 4 General Physics (Mechanics) PHYS 2211K 4 PHYS 212* 4 General Physics (E&M) PHYS 2211K 4 CHEM 12* 3 Chemical Principles I CHEM 1211K 4 CHEM 12* 3 Chemical Principles II CHEM 1211K L CHEM 13* 3 Chemical Principles II CHEM 1212K L CHEM 15 1 Experimental Chemistry CHEM 1212K L CHEM 15 1 Experimental Chemistry CHEM 1212K L CAS 100* 3 Rhetoric & Composition ENGL 1101 3 ENGL 202C* 3 Writing ENGL 1102 3 Architecture, Art History, Humanities, Elective* 3 HIST 1111(world list) <td></td> <td></td> <td>Math Review</td> <td>MATH 4390</td> <td>2</td> <td></td>			Math Review	MATH 4390	2	
MATH 035 3 General View of Math MATH 391 1 CMPSC 2016* 3 Fortran CSCI 3332 3 CMPSC 2010* 3 Fortran CSCI 3332 3 DHYS 211* 4 General Physics (Mechanics) PHYS 2211K 4 PHYS 212* 4 Gen. Physics (E&M) PHYS 2212K 4 CHEM 12* 3 Chemical Principles I CHEM 1211K 4 CHEM 14* 1 Experimental Chemistry CHEM 1211K L CHEM 13* 3 Chemical Principles II CHEM 1211K L CHEM 13* 1 Experimental Chemistry CHEM 1212K 4 CHEM 13* 1 Experimental Chemistry CHEM 1212K 4 BIOL 110 4 Intro Biology BIOL 1107K 4 ENGL 015* 3 Rhetoric & Composition ENGL 1101 3 ENGL 202C* 3 Writing MUSC 1000 Anathrotopic particles Architecture, Music, Theatre Arts ARTH 1000 American Studies, Classics, History, Human Devel	² MATH 318*	3	Probability	² MATH 3373	3	
MATH 035 3 General View of Math MATH 391 1 CMPSC 2016* 3 Fortran CSCI 3332 3 CMPSC 2010* 3 Fortran CSCI 3332 3 DHYS 211* 4 General Physics (Mechanics) PHYS 2211K 4 PHYS 212* 4 Gen. Physics (E&M) PHYS 2212K 4 CHEM 12* 3 Chemical Principles I CHEM 1211K 4 CHEM 14* 1 Experimental Chemistry CHEM 1211K L CHEM 13* 3 Chemical Principles II CHEM 1211K L CHEM 13* 1 Experimental Chemistry CHEM 1212K 4 CHEM 13* 1 Experimental Chemistry CHEM 1212K 4 BIOL 110 4 Intro Biology BIOL 1107K 4 ENGL 015* 3 Rhetoric & Composition ENGL 1101 3 ENGL 202C* 3 Writing MUSC 1000 Anathrotopic particles Architecture, Music, Theatre Arts ARTH 1000 American Studies, Classics, History, Human Devel	_	3	· .	² MATH 4343	3	Ì
MATH 035 3 General View of Math MATH 3993 3 CMPSC 201C 3 Fortran CSCI 3332 3 3 CSCI 3331 3 3 CSCI 3331 3 3 CSCI 3331 3 3 CSCI 3331 CSCI 3331 CSCI 3311		•	1			
CMPSC 201F* 3 Fortran CSCI 3332 3 PHYS 211* 4 General Physics (Mechanics) PHYS 2211K 4 PHYS 212* 4 Gen. Physics (E&M) PHYS 2211K 4 CHEM 12* 3 Chemical Principles I CHEM 1211K 4 CHEM 14* 1 Experimental Chemistry CHEM 1211K L CHEM 13* 3 Chemical Principles II CHEM 1211K L CHEM 14* 1 Experimental Chemistry CHEM 1212K L CHEM 15 1 Experimental Chemistry CHEM 1212K L BIOL 110 4 Intro Biology BIOL 1107K 4 ENGL 015* 3 Retoric & Composition ENGL 1101 3 ENGL 202C* 3 Writing ENGL 1102 3 3*Arts Elective* 3 Architecture, Art History, Integrative Arts, History, Integrative Arts, History, Integrative Arts, Integrative	MATH 035	3			3	
CMPSC 201C 3 Unix/C CSCI 3331 3 PHYS 211* 4 General Physics (Mechanics) PHYS 2211K 4 PHYS 212* 4 Gen. Physics (E&M) PHYS 2212K 4 CHEM 12* 3 Chemical Principles I CHEM 1211K 4 CHEM 14* 1 Experimental Chemistry CHEM 1211K L CHEM 13* 3 Chemical Principles II CHEM 1211K L CHEM 15 1 Experimental Chemistry CHEM 1212K L CHEM 15 1 Experimental Chemistry CHEM 1212K L BIOL 110 4 Intro Biology BIOL 1107K 4 ENGL 015* 3 Rhetoric & Composition ENGL 1101 3 ENGL 202C* 3 Writing ENGL 1102 3 3Arts Elective* 3 Architecture, Art History, Integrative Arts, Integrative Art		ŀ		CSCI 3332		
PHYS 211*		1	1	: 1		
PHYS 212*	J 00.2010	1				
CHEM 12" 3	PHY\$ 211*	4	General Physics (Mechanics)	PHYS 2211K	4	
CHEM 14" CHEM 13" Chemical Principles II CHEM 1212K 4 CHEM 1512K 4 CHEM 151	PHYS 212*	4	Gen. Physics (E&M)	PHYS 2212K	4	
CHEM 13° Chemical Principles II CHEM 1212K L	CHEM 12*	3	Chemical Principles I	CHEM 1211K	4	ļ
CHEM 15	CHEM 14*	1 1	Experimental Chemistry	CHEM 1211K	L	1
BIOL 110	CHEM 13*	3	Chemical Principles II	CHEM 1212K	4	
ENGL 015* CAS 100* CA	CHEM 15	1	Experimental Chemistry	CHEM 1212K	<u>L</u>	
CAS 100* ENGL 202C* 3	BIOL 110	4	Intro Biology	BiOL 1107K	4	
## ENGL 202C* 3 Writing	ENGL 015*	3	Rhetoric & Composition	ENGL 1101	3	
3 Architecture, Art History, Integrative Arts, Landscape Architecture, Music, Theatre Arts ARTH 1000 3.4.5 Humanities Elective* 3 Philosophy, Religious Studies HIST 1111(world hist) 3 Philosophy, Religious Studies HIST 2111(US hist) 3 Philosophy, Religious Studies HIST 2111(US hist) 3 POLS 1101(US govt) PYSC 1101 (gen psyc) 3 Anthropology, Human Development, Political Science, Psychology, Sociology Health & Physical Activity* 3 Various Physical Activity GEOSC 001* 3 Intro Physical Geol. GEOSC 021 3 Intro Earth History ARTH 1000 FENGL 2111(world list) A POLS 1101(US govt) PYSC 1101 (gen psyc) 3 ASOC 2008(cult divers) 2 PEDW 1 PEDW	CAS 100*	3	Effective Speech	COMM 1110	3	
3 Integrative Arts, Landscape Architecture, Music, Theatre Arts ARTH 1000 American Studies, Classics, History, Humanities, Elective* 3 Philosophy, Religious Studies HIST 1111(world hist) 3 4 POLS 1101(US govt) 3 Anthropology, Human Development, Political Science, Psychology, Sociology Health & Physical Activity* 3 Anthrophysical Activity GEOSC 001* 3 Intro Physical Geol. GEOSC 021 3 Intro Earth History ARTH 1000 FENGL 2111(world lit.) 3 FOLS 1101(US govt) 3 PYSC 1101 (gen psyc) 3 ASOC 2008(cult divers) 2 TPEDW 1 TPEDW 1 GEOSC 001* GEOSC 1121 ARTH 1000 FENGL 2111(world lit.) 3 FENGL 2111(worl	ENGL 202C*	3	Writing	ENGL 1102	3	
Arts Elective Candscape Architecture, Music, Theatre Arts		-	Architecture, Art History,			
Landscape Architecture, Music, Theatre Arts	3Arts Elective*	3		MUSC 1000		
American Studies, Classics, History, Humanities, American Studies, Classics, History Title, Tit	, 11.0 2.001.10	_	1	ADTU 4000		
3.4.5 Humanities Elective* 3 Philosophy, Religious Studies HIST 1111(world hist) 4 ENGL 2111(world lit.) 3 HIST 2111(US hist) 3 HIST 2111(US hist) 3 Philosophy, Religious Studies HIST 2111(US hist) 3 POLS 1101(US gott) PYSC 1101 (gen psyc) 3 PYSC 1101 (gen psyc) 4 SOC 2008(cult divers) 2 PSychology, Sociology 7 PEDW 1 PEDW		3		ARTH 1000		
3		3	•	HIST 1111(world hist)	3	
Science Elective 3		1		1 . 1		Į.
3	Elective⁺	3		· ·	3	
3.4.6 Social & Behavioral Science Elective* 3		,	Philosophy Religious Studies			
3.4.6 Social & Behavioral Science Elective* 3		 	Trinosopriy, Trongious Studios			
3				1	Ŭ	
Development, Political Science, Psychology, Sociology 4SOC 2008(cult divers) 2		3			3	
3 Psychology, Sociology divers) 2 Health & Physical Activity 3 Courses 7 PEDW 1 GEOSC 001* 3 Intro Physical Geol. GEOL 1121 4 GEOSC 021 3 Intro Earth History GEOL 1122 4		ļ				ļ
Health & Physical Activity		3	1 ' '	I as	2	
Health & Physical Activity		 	2)		1	1
Activity* 3 Courses 7 PEDW 1 7 PEDW 1 GEOSC 001* 3 Intro Physical Geol. GEOL 1121 4 GEOSC 021 3 Intro Earth History GEOL 1122 4			Various Physical Activity]		
GEOSC 001* 3 Intro Physical Geol. GEOL 1121 4 GEOSC 021 3 Intro Earth History GEOL 1122 4		3		⁷ PEDW	1	
GEOSC 021 3 Intro Earth History GEOL 1122 4				⁷ PEDW	1	
	GEOSC 001°	3	Intro Physical Geol.	GEOL 1121	4	
	GEOSC 021	3	Intro Earth History	GEOL 1122	4	
	GEOSC 201*	4	Mineralogy and Petrology	GEOL 2204	4	1

^{* =} course required for PSU Petroleum and Natural Gas Engineering BS degree

NOTES:

- 1. MATH 2203 and MATH 3223 of FVSU will be used to fulfill PSU's MATH 251 requirement
- 2. MATH 3373 and MATH 4343 of FVSU will be used to fulfill PSU's 6 credits of technical elective requirement
- 3. The 18 total credits of Arts, Humanities, and Social Science Electives can occur in a 6-6-6 or 3-6-9 credit distribution.
- 4. Satisfies the PSU Intercultural & International Competence requirement; the US Cultures requirement will be waived in view of the FVSU experience
- 5. Other FVSU courses may apply to this category, including, but one course has to be in the area of eethical issues in science and/or engineering
- 6. Other FVSU courses may apply to this category, including, but one course has to be in microeconomics
- 7. Any combination of 1 or 2 credit PEDW classes that totals 3 credits will suffice in this category

Ш

APPENDIX C

SUGGESTED SEQUENCE OF COURSES AT PSU FOR THE CHEMISTRY-PETROLEUM AND NATURAL GAS ENGINEERING DUAL DEGREE PROGRAM

FVSU-PSU Dual Degree Program in Chemistry and Petroleum and Natural Gas Engineering (70 FVSU Credits + 58 PSU Credits = 128 Credits)

<u>CHEMISTRY – PNGE</u>

<u>I</u>		<u>II</u>		
CMPSC 201F EMCH 210 PHYS 213 PNG 405 PNG 406 PNG 489	(3) (5) (2) (3) (1) (3) 17	EMCH 012 GSCI 454 PNG 410 PNG 450 PNG 451 PNG 490	(3) (3) (3) (3) (1) (1) 14	
<u>III</u>		<u>IV</u>		
EGEE 301 PNG 420 PNG 430 PNG 440W PNG 491	(5) (4) (3) (3) (1) 16	PNG 425 PNG 475 PNG 480 PNG 482 PNG 492	(3) (3) (3) (1) (1) 11	

APPENDIX D

0

SUGGESTED SEQUENCE OF COURSES AT PSU FOR THE MATHEMATICS-PETROLEUM AND NATURAL GAS ENGINEERING DUAL DEGREE PROGRAM

FVSU-PSU Dual Degree Program in Mathematics and Petroleum and Natural Gas Engineering (73 FVSU Credits + 55 PSU Credits = 128 Credits)

MATH - PNGE

Ī		ĪĪ	
EMCH 210 PHYS 213 PNG 405 PNG 406 PNG 489	(5) (2) (3) (1) (3) 14	EMCH 012 GSCI 454 PNG 410 PNG 450 PNG 451 PNG 490	(3) (3) (3) (1) (1) (1)
<u>III</u>		<u>IV</u>	
EGEE 301 PNG 420 PNG 430 PNG 440W PNG 491	(5) (4) (3) (3) (1) 16	PNG 425 PNG 480 PNG 482 PNG 492 PNG 475	(3) (3) (1) (1) (3) 11

APPENDIX E

LIST OF COURSES FVSU STUDENTS WILL BE EXPECTED TO TAKE AT PSU

CHEMISTRY-PNGE TRACK		MATH-PNGI	MATH-PNGE TRACK	
EMCH 210	(5)	EMCH 210	(5)	
PHYS 213	(2)	PHYS 213	(2)	
EMCH 012	(3)	EMCH 012	(3)	
CMPSC 201	(3)	PNG 405	(3)	
PNG 405	(3)	PNG 406	(1)	
PNG 406	(1)	EGEE 301	(5)	
EGEE 301	(5)	PNG 489	(3)	
PNG 489	(3)	PNG 410	(3)	
PNG 410	(3)	PNG 450	(3)	
PNG 450	(3)	PNG 451	(1)	
PNG 451	(1)	PNG 475	(3)	
PNG 475	(3)	PNG 490	(1)	
PNG 490	(1)	GSCI 454	(3)	
GSCI 454	(3)	PNG 420	(4)	
PNG 420	(4)	PNG 430	(3)	
PNG 430	(3)	PNG 440W	(3)	
PNG 440W	(3)	PNG 491	(1)	
PNG 491	(1)	PNG 425	(3)	
PNG 425	(3)	PNG 480	(3)	
PNG 480	(3)	PNG 482	(1)	
PNG 482	(1)	PNG 492	<u>(1)</u>	
PNG 492	<u>(1)</u>		55	
	58			
PNG	37	PNG	37	
ENGSC	13	ENGSC	13	
GEOSC	3	GEOSC	3	
COMPSC	3	PHYS	2	
PHYS	2		<u>55</u>	
-	5 8			