COLLEGE OF ENGINEERING & APPLIED SCIENCE
UNIVERSITY OF WYOMING

WORKING FOR WYOMING & THE WORLD

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Date: 26 August 2016

To: Kate Miller, Provost and Vice President of Academic Affairs
Anne Alexander, Associate Vice President of Academic Affairs

From: Michael V. Pishko
Dean, College of Engineering & Applied Science

RE: Petroleum Engineering Program Review

As per instructions from Academic Affairs, the Petroleum Engineering M.S. program has been reviewed. Pursuant to UW guidelines for program review, I recommend the program mentioned above be retained as mission critical. The energy industry, whose workforce needs are met by disciplines such as petroleum engineering, has been identified as a critical component of Wyoming's economy and also a key element of the Tier 1 Engineering Initiative as created by the Wyoming State Legislature and Governor's office. As such, the program should be retained and enhanced to support the state's economic interests.

It should also be noted that the Department of Petroleum Engineering was recently re-established, has grown from 5 faculty FTEs to 10, and has made graduate student recruitment a priority. The M.S. program is also a feeder program for a Ph.D. in petroleum engineering, a program with sufficient strength not to merit review at this time.

cc: Hertanto Adidharma, Steve Barrett, Megan Barber, File

Academic Program Review
Report Template
University of Wyoming
Office of Academic Affairs
March 2016

(adapted from SDSU)

Deans and Directors who administer an authorized major or course of study approved by action of the Board of Trustees will be responsible for conducting program reviews. Four key elements should be addressed in each academic program review: (1) Program Demand, (2) Program Quality, (3) Mission Centrality, and (4) Cost.

For each program that is reviewed, a recommendation will be made by the Academic Dean to the Vice President of Academic Affairs.

Instructions: *Please provide the following information:*

Title of Program/Specialization: Petroleum Engineering
Indicate whether undergraduate or graduate program/specialization: Graduate/MS
Department and College: Petroleum Engineering/Engineering and Applied Science
Department Head Name and contact information (phone, email):
Hertanto Adidharma (766-2909, adidharm@uwyo.edu)

Part 1 – Program Review

Instructions: *Please answer each of the following questions. Items listed under each question have been provided to help guide your response. If an item is not applicable, simply indicate "N/A".*

1. **Program Demand*:**
   (*Note: If degrees granted exceeds cutoff, delay review until next round.*)
   a. Number of graduates over 5-year period: **25**
   b. Enrollment in major/specialization over 5-year period: **77**

   * Cutoffs for "Low Demand" Designation -- *Degrees Granted*
   - Bachelor's Programs: Average – 5 per year; 5-year total: 25
   - Master's Programs: Average – 3 per year; 5-year total: 15
   - Ph.D. Programs: Average – 1 per year; 5-year total: 5

   (See APPENDIX A for the types of programs that will be excluded from review.)

2. **Program Quality: Is the program of high quality?**
   a. Program accreditation **No accreditation required**
      i. For programs currently accredited include:
         1. Name of accrediting body/organization
         2. Date most recently accredited
         3. Next reaccreditation date

4. List recommendations from most recent visit and progress to date.

ii. For programs seeking accreditation include: **N/A**
   1. Name of accrediting body/organization
   2. Timeline for seeking accreditation

iii. For all other programs include: **N/A**
   1. Date of most recent Academic Program Review (APR)
   2. List of recommendations from the most recent APR and progress to date.

(Note: For first-time reviews, include N/A in response.)

b. Credentials of faculty **See Attachment 1**
   i. Include a list of all faculty by name, highest degree and discipline of highest degree.
   ii. Also, include a breakdown by gender and ethnicity.
   iii. Grants awarded to academic personnel: Previous 5 years
   iv. Grants submitted by academic personnel: Previous 5 years
   v. Publications/presentations by academic personnel
   vi. National/international awards
   vii. Other

c. Program reputation
   i. If program is ranked, include rank and by what organization.

   In 2016, the graduate petroleum engineering program was ranked ninth (9^{th}) by the US News.

   ii. Include a brief description of any other indicators of program reputation such as demand (e.g. waiting lists or over enrollment) for admission into program, employer data/feedback, etc.

   We receive positive feedback from industry representatives and our graduate students find productive employment in the field.

d. Curriculum of major or specialization
   i. Include a list of courses by prefix, number, title required in the major or specialization (do not include general education course unless required as part of the major requirements.)

MS Course Requirements

Graduate students with a BS degree from an accredited program may pursue their MS degree using one of two options. The requirements for each degree option are as follows:

1. Plan A: Thesis Research Option

Items	Course Description	Credits
Core courses	At least three courses from the following: PETE 5020 - Thermodynamics PETE 5010 - Transport Phenomena PETE 5080 - Interfacial Phenomena PETE 5310 - Fundamentals of Enhanced Oil Recovery PETE 5060 - Flow through Porous Media Required course PETE 5355 - Mathematical Methods	9 3
Seminar	PETE 5890 - Graduate Seminar	2
Electives	Graduate-approved elective courses (PETE or other), selected by the student with approval of the student's advisor. Suggested Elective Courses.	12
Thesis	PETE 5960 - Thesis Research	4
	TOTAL	**30**

2. Plan B: Course Work Option

Items	Course Description	Credits
Core courses	At least three courses from the following: PETE 5020 - Thermodynamics PETE 5010 - Transport Phenomena PETE 5080 - Interfacial Phenomena PETE 5310 - Fundamentals of Enhanced Oil Recovery PETE 5060 - Flow through Porous Media Required course PETE 5355 - Mathematical Methods	9 3
Seminar	PETE 5890 - Graduate Seminar	2
Electives	Graduate-approved elective courses (PETE or other), selected by the student with approval of the student's advisor. Suggested Elective Courses.	14
Creative Component	PETE XXXX – Research Report	2
	TOTAL	**30**

e. Distance delivery of program/major *None offered currently*
   i. Note if the program is offered online and/or at one of the off-campus attendance centers (e.g., UW-Casper)

f. Quality of Assessment Plan/data
   i. Include a brief description of the program assessment plan and how the data are used to inform decisions related to program quality and student learning.

We have developed a rubric for the MS program assessment. The assessment process will begin in the Fall Semester of 2016.

*Following are the learning outcomes for the **MS Plan A** program:*

1. ***Problem Definition**: States the research problem clearly, providing motivation for undertaking the research*
2. ***Literature and Previous Work**: Demonstrates knowledge of literature in the area, and prior work on the specific problem of research.*
3. ***Impact of Proposed Research**: Demonstrates the potential value of the solution to the research problem in advancing knowledge and/or improving economics.*
4. ***Solution Plan**: Developed a sound plan for applying state-of-the-art research methods/tools to solving the defined problem.*
5. ***Data Analysis**: Demonstrates/proposes/executes a sound plan for analyzing and interpreting research results/data.*
6. ***Quality of Written and Oral Communication**: Communicates research results clearly and professionally in both **(a) written** and **(b) oral** form.*
7. ***Critical Thinking**: Demonstrates capability for research and problem solving in the area of study.*

*Following are the learning outcomes for the MS **Plan B program**:*

1. ***Problem Definition**: States the research problem clearly, providing motivation for undertaking the research*
2. ***Literature and Previous Work**: Demonstrates knowledge of literature in the area, and prior work on the specific problem of research.*
3. ***Impact of Proposed Topic**: Demonstrates the potential value of the topic selected.*
4. ***Quality of Written and Oral Communication**: Communicates research results clearly and professionally in both **(a) written** and **(b) oral** form.*
5. ***Critical Thinking**: Demonstrates capability for research and problem solving in the area of study.*

g. Strategic Plan
   i. Include a brief description of any plans for the program or specialization that appear in the college/department strategic plan (i.e., facilities upgrades, curriculum changes, on-line or off-campus delivery, enrichment learning opportunities, etc.)

   The PETE graduate program constitutes a critical element of our college-wide strategic plan. The Tier-1 initiative clearly documents the centrality of energy research in our current and future endeavors.

   Currently, significant investments in research/educational facilities are underway to advance our capabilities in research, instruction, and outreach.

h. Other: *N/A*

3. **Mission Centrality: Does the program advance the mission of UW including institutional strategy?**
    a. Describe how the program supports the mission, vision and strategic goals of UW.

    This program supports our technical needs in the energy sector, which is the dominant element in the state economy.

    b. Describe how the program contributes to other programs across campus (i.e., general education courses, minor or support courses, interdisciplinary program, etc.)

    The program has significant contributions to the interdisciplinary efforts in the energy field and in earth science disciplines.

    c. Include placement data for graduates and indicate if graduates are working in the field or not.

    We do not have current statistical data for our recent graduate students. This data are assembled for our undergraduate program.

    d. Describe the uniqueness or duplication of this program across the UW.

    This is a unique program serving specific needs.

    e. Other: *N/A*

4. **Cost: Is the program financially viable?**
    a. Ratio of student credit hours per FTE: *Average per FTE = 278.9 hours*

    b. Direct instructional expenditures:

        i. Per student credit hour: *Only available for the combined CPE Department. (No separate data for PETE). $10,054*

        ii. Per total degrees awarded: *Only available for the combined CPE Department. (No separate data for PETE). $33,564*

        iii. Non-personnel expenditures per total academic FTE: *Only available for the combined CPE Department. (No separate data for PETE). $176,676 FY15*

    c. Course enrollment
        i. Number of classes falling under University minimums *0*
        ii. Lower-division courses falling under University minimums *0*

    d. Other instructional cost drivers, such as:
        i. Section fill rates
        These data are being compiled but are not currently available.
        ii. Course completion rates

These data are being compiled but are not currently available.

iii. Curricular complexity
A well-integrated curriculum combining rigorous fundamentals, practical knowledge, and professional mentoring is employed in our program.

iv. Faculty course load: *1/1 or 2/1 or 1/2*

e. Research expenditures per tenured/tenure-track FTE (and other academic personnel, where appropriate)

Average per faculty = $191,032

f. Compare your data to national benchmarks (Delaware data)

g. Other:

Part II - Recommendations

Instructions: *After the review is completed, the Dean in consultation with the Department Head will select one of the following recommendations. In the justification, address each of the items associated with the recommendation.*

1) **Retain Due to Critical Need**
   a) A college may recommend that a degree program be retained due to its ability to fulfill a critical workforce need or shortage area for the state.

   b) Justification for retaining due to critical need must include:
      i) Explanation of why the program is important to the University/State/region
      ii) Description of specific steps (already taken and/or planned) to increase enrollment and graduate production;
      iii) Preliminary outcomes of steps taken.

2) **Retain with Further Review Required**
   a) A college may request that a program be retained for further review for those degree programs that serve a specific function central to the mission of the college or university.

   b) Justification for retain due to further review must include:
      i) Explanation for how the program is central to the university's mission and the benefit to the system;
      ii) Description of specific steps (already taken and/or planned) to increase enrollment and graduate production;
      iii) Preliminary outcomes of steps taken.

3) **Consolidate with Another Program within College**
   a) A college may request that a program be consolidated with a similar program on campus that achieves similar degree requirements.

   b) Justification to consolidate with another program on campus must include:
      i) Explanation for how the degree requirements for the two programs warrant consolidation;
      ii) Evidence that the consolidation will meet graduate production thresholds, or specific steps to increase enrollment to meet production thresholds;
      iii) Preliminary outcomes of steps taken.

4) **Consolidate with Program(s) between Colleges/campuses (e.g., UW/C)**
   a) Two or more colleges may request that similar degree programs be consolidated to maintain equivalent degree programs.

   b) Justification for retaining due to cross-college consolidation must include:
      i) Explanation for how the consolidated programs will collaborate (e.g., sharing of required courses, shared faculty, etc.) to maintain graduate production thresholds;

ii) Evidence that multi-college collaboration will meet graduate production thresholds, or specific steps to increase enrollment if merging programs fails to meet production thresholds;
iii) Preliminary outcomes of collaboration between colleges.

5) **Terminate**
   a) A college may request that a program be terminated due to limited graduate production, lack of student interest, shifts in a given field of study, or continued declines in major enrollments.
   b) If the exigency for termination results from the program productivity review process then a brief justification to terminate a program should be included. Such a justification must include:
      i) Explanation for the decline in graduate production in the degree program;
      ii) Intended timeframe for submitting a program termination request to the Board of Trustees for their consideration;
      iii) Expected timeline to meet teach-out requirements established through the regional accrediting body.

APPENDIX A

"Low Productivity" Programs Excluded from Review Process

1) **Major Program Modifications**
   a) Degree programs that have undergone recent program modifications that adversely impact graduate production for a college.
   b) Modifications traditionally include programs that have undergone recent name changes during the reporting window that result in two equivalent degree programs.

2) **Program/Major Specializations**
   a) Degree programs that have one or more specializations which reduce the total number of graduates.
   b) The exclusion may apply only for those specializations where the combination results in graduate production that meets the establish threshold for the degree.

3) **Terminated Programs**
   a) Degree programs that have been inactivated during the reporting period, but still depict graduates that fall below the established thresholds.
   b) Terminated programs will remain on the Program Productivity Report until inactive programs have completely cycled through the established reporting period.

4) **New Programs**
   a) Degree programs that have been activated within the past 7 years resulting in limited graduate production due to program implementation.
   b) Institutional review may be requested prior to the 7th year if graduate production is not scaling to the required thresholds for the degree level.

Attachment 1

Faculty	Degree	Discipline	Gender	Ethnicity	Grant Awards	Grant Submissions	Publications	Awards
Adidharma, Hertanto	PhD	ChemEng	M	A	5	7	2	
Goual, Lamia	PhD	PetroEng	F	C	14	8	4	
Piri, Mohammad	PhD	PetroEng	M	C	12	4	9	
Yin, Shunde	PhD	GeoTechEng	M	A	6	9	3	
Fan, Maohong	PhD	ChemEng/MechEng / EnvEng	M	A	18	3	29	
Gasem, Khaled	PhD	ChemEng	M	C	5	3	5	
Morrow, Norm*	PhD	MineralEng	M	C	0	0	0	
Radosz, Maciej	PhD	ChemEng	M	C	3	0	1	
Sharma, MP	PhD	MechEng	M	A	0	0	0	
Baum, Kenneth	BS/MBA	PetroEng	M	C	0	0	0	
Toelle, Brian	PhD	Geology	M	C	0	0	1	
Fu, Xuebing	PhD	PetroEng	F	A	0	0	0	
Nojabaei, Bahareh*	PhD	PetroEng	F	C	0	0	0	
Cuthbertson, Doug**	BS	PetroEng	M	C				
Dejam, Morteza**	PhD	PetroEng	M	C				
Saraji, Soheil**	PhD	PetroEng	M	C				
Tahmasebi, Pejman**	PhD	PetroEng	M	C				

***Departed/Retired 2016**

****New faculty for 2017**