Academic Partnership for a Master’s of Science Degree in Petroleum Engineering

Antonio Sevilla
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MSPE Sustainability Components

- Committed UEM Leadership and Private Industry Support
- Dedicated U.S. and UEM Expert Faculty
- Virtual Delivery Approach
- Metric-driven Project Management
- Capable and Motivated Students
- “Fit for Purpose” Curriculum
“Fit for Purpose” Curriculum

Research and Technical Seminars
- Ethics in Engineering
- Technical Communications & Presentation Skills for PEs
- Learning Resources
- Professional Service
- Project Management
- Operational & Risk Management
- Petroleum Geoscience Technologies
- Petroleum Engineering Technologies
- Emerging Technology
- Commercial & Economics
- Scientific Methods
- Research Approach
- Data Analysis
- Literature Review
- Report Writing

Core Program
- Production Operations and Facilities Engineering
- Reservoir Engineering and Petrophysics
- Drilling and Completion Systems
- Geoscience for Petroleum Engineers

1st Semester
- Phase Behavior
- Advanced Drilling Techniques
- Applied Mathematics of Fluid Flow in Porous Media

2nd Semester
- Technical Seminars
- Formation Evaluation
- Advanced Production Engineering
- Advanced Reservoir Engineering

3rd Semester
- Research Seminars
- Integrated Reservoir Management
- Reservoir Modeling

4th Semester
- Dissertation Completion

Master’s Research Dissertation

Masters Pre-requisites
- Masters Year 1
- Masters Year 2
Core Program Professors

Geoscience for Petroleum Engineers

Dr. Walt Ayers
Texas A&M University

Dr. Mussa Achimo
UEM

Production Operations and FE

Dr. Mauricio Prado
University of Tulsa

Dr. Alexander Ali
UEM

Drilling and Completion Systems

Dr. Lloyd Heinze
Texas Tech University

Dr. Rui Sitoe
UEM

Reservoir Engineering and Petrophysics

Dr. Maria Barrufet
Texas A&M University

Dr. Luis Lucas
UEM
Master’s Program Professors

Phase Behavior of Fluid Dynamics
Dr. Maria Barrufet
Texas A&M University
Dr. Luis Lucas
UEM

Applied Mathematics
Dr. Erdal Ozkan
Colorado School of Mines
Dr. Alexandre Kalashnikov
UEM
Dr. Fabiao Cumbe
UEM

Advanced Drilling Techniques
Dr. Lloyd Heinze
Texas Tech University
Dr. Rui Sitoe
UEM

Formation Evaluation
Dr. Thomas Holley
University of Houston
Dr. Manuel Chenene
UEM
Master’s Program Professors, continued

Advanced Production Engineering

Dr. Mauricio Prado  
University of Tulsa

Dr. Alexander Ali  
UEM

Advanced Reservoir Engineering

Dr. Erdal Ozkan  
Colorado School of Mines

Dr. Antonio Cumbane  
UEM

Reservoir Modeling

Dr. Turgay Ertekin  
Penn State

Dr. Antonio Cumbane  
UEM

Integrated Reservoir Management

Dr. Mohan Kelkar  
University of Tulsa

Dr. Manuel Chenene  
UEM
Course Delivery Demonstration

Video clip from Phase Behavior Course
Master’s of Petroleum Engineering Program Delivery Evolution

Base
Professor Course Delivery
- Synthesize PE content
- Utilize existing subject resources and materials

Student Capability
- Understand subject
- Pass course
- Utilize course materials

Skilled
Professor Course Delivery
- Analyze and evaluate data
- Enhance existing materials

Student Capability
- Synthesize content across courses
- Apply knowledge
- Integrate previous course materials
- Seek guidance from professor

Expert
Professor Course Delivery
- Provide PE subject matter expertise
- Create new materials
- Perform original experiments
- Research and manage process

Student Capability
- Hypothesize solutions for new problems
- Perform original experiments and research
- Seek guidance from professor and industry subject matter experts
Student Capability Building Model – Educating for Employment

Petroleum Engineering Coursework
- Core & Master’s courses
- Technical & Research seminars

Professional Association/Industry Support & Involvement
- Field experiences
- Industry conferences
- Mentors
- Work/study or internships

Student Development & Support
- Graduate advisory program
- Research dissertation committee
- English & math enrichment

Capable & Employable Students
Student Development

- Master’s Year Two: 22
  - Eligible for Dissertation: 13
- Master’s Year One: 18
- Core Program: 14
UEM MSPE Student Profiles

Students by Undergraduate Degree

- MEEN: 18 (34%)
- CHEN: 12 (22%)
- OTHER ENG: 6 (11%)
- GEOL: 4 (7%)
- PHYS: 4 (7%)
- CHEM: 3 (6%)
- OTHER: 3 (6%)

Students by Source

- PROFESSIONAL: 34 (46%)
- UEM Undergraduate: 11 (15%)
- UEM Faculty: 9 (12%)

Students by Gender

- Female: 8 (11%)
- Male: 46 (66%)

Students by Birth Province

- Maputo City Province: 22 (34%)
- Maputo Province: 6 (10%)
- Gaza Province: 6 (10%)
- Nampula Province: 4 (7%)
- Sofala Province: 4 (7%)
- Tete Province: 3 (5%)
- Inhambane Province: 3 (5%)
- Zambezia Province: 2 (3%)
- Manica Province: 1 (2%)
Student Demonstration – Core Reservoir

3. Determination of Original Oil In Place

Utilization of the Material Balance:
1. Non-volumetric reservoir
2. Both saturated and under saturated cases
3. Gas and water injection
4. No aquifer
5. No water production

\[
N = \frac{N_p}{} \left[ B_t + (R_p - R_{vt})B_o \right] - G_t B_{g, inj} \left( B_z - B_{vt} \right) + \frac{B_{f, inj}}{1 - S_{wi}} \left( c_f + S_{wi}c_w \right) \Delta p
\]

Graph: Reservoir - Group 1

- \( y = 289x \)
- \( R^2 = 0.9914 \)
## Summary: 2015 UEM PE Program Goals

<table>
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<tr>
<th>Program Area</th>
<th>2015 Goals</th>
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| **UEM Leadership**                               | • Establish ongoing petroleum advisory board  
• Conduct UEM leadership updates and Academic Advisory Council (AAC) meetings                                                           |
| **Faculty Development**                          | • Identify backup professors  
• Provide 2-3 week onsite training to UEM professors at US Universities  
• Identify and begin training future UEMPE faculty |
| **Curriculum and Course Development and Delivery** | • Develop and manage dissertation process guide  
• Deliver remaining technical seminars                                                                                                  |
| **Student Selection and Development**            | • Establish internship program and facilitate graduate job placement  
• Develop sustainable English & Math Practice programs                                                                                  |
| **Physical and Virtual Infrastructure**          | • Develop and transition Petroleum Engineering Program guide  
• Transition all technical infrastructure and support to UEM                                                                             |
Collaborative Program Model

Industry

- Curriculum & Research Guidance

Advisory Board

- Program Development

Government

- Industry Integration

UEM

Master’s Programs

Baccalaureate Programs

COLLABORATIVE PARTNERS

- Industry Partners
- Academic Partners
- NGOs
- Others

Guidance & Support

Prepare for Job Opportunities

Mozambican Secondary School Education

INDUSTRY

- Oil & Gas
- Environmental
- Hydrologic
- Education
- Public/Govt. Service
Closing/Acknowledgements