Petroleum & Natural Gas Engineering

An Excellent Career
An Exceptional Program

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OUTLINE

- Oil & Gas Industry
- Petroleum Engineering as a Career
- Petroleum Engineering as a Program at WVU
Oil & Gas Industry

Projected U.S. Energy Consumption and Production in Three Cases, 1990-2020 (quadrillion Btu)

- Constant Energy Intensity
- Consumption Assuming Declining Energy Intensity
- Domestic Production

Source: Energy Information Administration

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Oil & Gas Industry

- Oil Industry began in 1859 (142 years ago) in Titusville, PA.

**Total Global Oil Production**

- Remains to be Produced: 2,500 Billion Barrels
- Produced in the past 142 years: 900 Billion Barrels

Source: Journal of Petroleum Technology, January 2000

*We are not even half way there!!!!*
Oil & Gas Industry

- World Oil Production Has Not Yet Peaked.
- After the Peak Almost 50% of Ultimate Reserves Has Been Produced.
- Large Quantities of Oil Are Yet To Be Discovered & Produced.
Oil & Gas Industry

- Demand For Oil Will Continue to Increase for the Foreseeable Future.
- After the Peak, Oil Prices Will Increase and Remain High
- After Decline in Conventional Oil Production Begins, Unconventional Oil & Gas Resources Become a Viable Alternative.
Oil & Gas Industry

- Unconventional Hydrocarbon Resources
  - Tight Reservoirs
  - Coalbed Methane
  - Gas Shales
  - Heavy Oil
Oil & Gas Industry

- Unconventional Resources

Tight Gas Sand Basins
Unconventional Resources

U.S. Coalbed Methane Resource

- Western Washington coal region 24 Tcf
- Greater Green River basin 314 Tcf
- Uinta basin 10 Tcf
- Piceance basin 99 Tcf
- San Juan basin 84 Tcf
- Raton basin 10 Tcf
- Powder River basin 39 Tcf
- Wind River Basin 6 Tcf
- Illinois basin 21 Tcf
- Northern Appalachian basin 61 Tcf
- Central Appalachian basin 5 Tcf
- Black Warrior basin 20 Tcf
Oil & Gas Industry

- Unconventional Resources

U.S. Gas Shale Resource

- Bakken
- Niobrara
- Green River
- Cane Creek
- Lewis and Mancos
- Woodford
- Barnett
- Antrim
- New Albany
- Ohio
- Monterey
- McClure

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Oil & Gas Industry

World Oil Reserves

- Middle East
- North & South America
- Africa
- Eastern Europe & Former Soviet Union
- Asia Pacific
- Western Europe

Billion Barrels

0 100 200 300 400 500 600 700
Oil & Gas Industry

Oil Reserves by Country

<table>
<thead>
<tr>
<th>Country</th>
<th>Billion Barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saudi</td>
<td>300</td>
</tr>
<tr>
<td>Iraq</td>
<td>250</td>
</tr>
<tr>
<td>Ven</td>
<td>150</td>
</tr>
<tr>
<td>Russia</td>
<td>100</td>
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<tr>
<td>USA</td>
<td>50</td>
</tr>
<tr>
<td>UK</td>
<td>10</td>
</tr>
<tr>
<td>Canada-HO</td>
<td>200</td>
</tr>
<tr>
<td>Venezuela-HO</td>
<td>250</td>
</tr>
</tbody>
</table>
Oil & Gas Industry

World Gas Reserves

Trillion Cu. Ft.

EE&FSU  ME  NSA  AF  AP  WE
Oil & Gas Industry

Total Global Gas Production

- 170 Trillion Cubic Meter
- 60 Trillion Cubic Meter

Remains to be Produced
Already Produced
Career in Oil & Gas Industry

- Given what remains to be produced:
  - Oil (Conventional & Heavy Oil)
  - Gas (Conventional, Shale, Tight Sand, CBM)
- Even your grandchildren can have a great career in the oil & gas industry.
How Much Engineers Make?

Based on 2005 Survey, U.S. Department of Labor

Source: http://stats.bls.gov/oco/ocos021.htm#earnings

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How Much Engineers Make?

Based on 2005 Survey, U.S. Department of Labor

Source: http://stats.bls.gov/oco/ocos027.htm#earnings

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How Much Engineers Make?

Median Annual Salaries of U.S. Engineers-All Degree Levels
By Years Since Degree

WHY Petroleum Engineering?

Petroleum Engineer's
ANNUAL SALARY ACCORDING TO COUNTRY/REGION

<table>
<thead>
<tr>
<th>Region</th>
<th>Annual Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>$89,357</td>
</tr>
<tr>
<td>U.S.</td>
<td>$92,413</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>$78,963</td>
</tr>
<tr>
<td>North Sea &amp; Africa</td>
<td>$66,166</td>
</tr>
<tr>
<td>Canada</td>
<td>$69,407</td>
</tr>
<tr>
<td>S. America &amp; Caribbean</td>
<td>$81,970</td>
</tr>
<tr>
<td>Middle East</td>
<td>$69,604</td>
</tr>
<tr>
<td>South Central &amp; East Europe</td>
<td>$69,604</td>
</tr>
</tbody>
</table>

Source: https://www.spe.org/pdf/02_salary_survey.pdf

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WHY Petroleum Engineering?

ANNUAL SALARY ACCORDING TO YEARS OF WORK EXPERIENCE BY COUNTRY/REGION

- Asia Pacific
- Canada
- Middle East
- N. Sea & Africa
- S. America & Carribean
- S. Central & E. Europe
- U.S.

Source: [http://www.spe.org/pdf/02_salary_survey.pdf](http://www.spe.org/pdf/02_salary_survey.pdf)
Why Petroleum Engineering?

- It is, and has been for the past 20 years, the highest paying engineering discipline.
- May 2004 Starting Salary for Our Department’s Graduates with B.S.
  - Low    $52,800
  - High   $70,000
WHY Petroleum Engineering?

- **SCHOLARSHIP  100%**
  - Complete 14 Credit Hours / Semester.
  - Cum. GPA of 2.5 or Higher.

- **SUMMER INTERNSHIP  95%**
  - We Actively Encourage and Help Our Students to Secure Summer Positions.
WHY Petroleum Engineering?

- In-State Tuition $4,832/year
- Out of State Tuition $13,912/year
- Difference: $9,080/year
- For your 4 year degree: $36,320
- If it takes you 5 year: $45,400
WHY Petroleum Engineering?

- As a PNGE major @ WVU, you may be eligible for In-State tuition.
- It can save up to $45,000 while in school.
- Plus you will start with a salary that usually is about $10-20K more than other engineering graduates.

Source
http://www.sreb.org/programs/acm/acmindex.asp
Many jobs, including several engineering jobs are being outsourced to countries such as India and China.

Petroleum Engineering Jobs are and will be going to other countries … all over the world.

The difference is … you will go with it.
What Is Petroleum Engineering?

- Petroleum Engineering is the Art and Science of Economically Producing Hydrocarbons.
- Right Brain Engineering.
For Whom Would I Be Working?

- Major Oil Companies
- Oil & Gas Service Companies
- Independent Producers
- Consulting Firms
- Pipeline Companies
- State and Federal Government
Where Will I Be Working?
What Will I Be Doing?

- Design New Wells to be Drilled
- Design Frac Jobs
- Optimize Reservoir Production
- Increase Well Deliverability
- Analyze Production Data
- Evaluate Reservoir Performance
- ....
What Will I Be Studying?

- The common Engineering curriculum for the first two years.
- In Junior and Senior years:
  - Principles of Drilling Engineering
  - Principles of Reservoir Engineering
  - Principles of Production Engineering
  - Principles of Formation Evaluation
How Would I Be Treated?

- Small Program.
- A Family Environment.
- Easy Access to All Faculty at All Time.
- All Courses Taught by Faculty not TAs.
- Small Classes.
- Faculty Take an Interest in Your Success.
How Do I Find A Job?

- Summer Internships.
- Exclusive Interviews.
- Help From Faculty Contacts.
- Student Chapter of Society of Petroleum Engineers.
- Networking with the Industry Representatives in Meetings.
What Makes Us So Special?

- PNGE PROJECT RETENTION
  - Exclusive Private Tutoring
    - Math
    - Chemistry
    - Physics
    - Static
    - Mechanics of Materials
    - Fluid Mechanics
    - Statistics
What Makes Us So Special?

- PNGE PROJECT RETENTION
  - High Quality Resume Preparation.
  - Mock Interviews with our industry professionals.
  - Mentoring.

**WE ACTUALLY DO CARE, .. & IT SHOWS**
How Do I Get In?

- Looking for:
  - a few good men and
  - a few good women.

- We will keep our program small.

- We believe in high quality service to our students and we will not dilute our mission by large numbers.
HOW DO I APPLY?

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Email: shahab@wvu.edu
Testimonial from Past Graduates

“During my tenure at WVU I feel that I received an excellent education that has fueled my success as an Engineer. I currently work as an Engineer and Six Sigma Black Belt with Dominion headquartered in Richmond, Virginia. I enjoy my job to the fullest extent making the transition from theoretical to practical experience smooth. In my job role with Dominion I am tasked with reaching a savings target of $1.1 Million dollars per year. In a 3-year period my team and I have saved the company approximately $3 Million/year cumulative. Within this 3-year period I have obtained an MBA from Virginia Commonwealth University, Six Sigma certification, and two publications.

I allocate a great portion of my success to the education I received from my professors in the PNGE department. My experience with the PNGE faculty has been great and I look forward to visiting often.

Christian Siplin,
Class of 2000
Testimonial from Past Graduates

“... as a Production Engineer ... I am responsible for 250 producing oil wells ... My key responsibility is to increase daily production, ... and drilling 20 new wells per year. After only 2 ½ years on the job I may be responsible for spending a budget of $5,000,000 or more per year.

All of the tools I need to perform my job I gained from my coursework with the WVU Department of PNGE. I learned things such as presentation skills, technical writing skills, analytical skills, and economic analysis. Also, with the PNGE Department’s close ties to the oil industry I was able to secure several summer internships and eventually a full time job with an international oil company.

Petroleum engineering is a fast paced, interesting career with new challenges everyday. It requires creativity to imagine what may be happening below the surface and a willingness to be hands-on and think outside the box.

There is no other job that I can think of where a new hire can assume substantial responsibility, earn a high salary, and have great opportunities to work internationally directly after graduating from college.

Dana Glessner,
Class of 2000
Testimonial from Past Graduates

"After graduating from WVU, I began my career working for ChevronTexaco in the Gulf of Mexico Business Unit in New Orleans, Louisiana. Here I work as both a production and reservoir engineer in five fields (both onshore and offshore) with a total of approximately 850 wells. I chose to work for ChevronTexaco for the global opportunities available – in Scotland, England, Australia, Africa, Russia, and Indonesia, just to name a few. My education at WVU fueled these opportunities, giving me the well-rounded, technical background needed to work for a global energy company. The close-knit group of professors and students in the PNGE department provided a strong bond, uncommon in other departments.

ChevronTexaco

Shahab, Dr. Aminian, Dr. Bilgesu, and Sam went above and beyond their roles as professors - acting as mentors, counselors, and most importantly friends. I will be forever grateful for the lessons they taught me, both inside the classroom and out."

Bevin VanGilder,  
Class of 2002
Testimonial from Past Graduates

“There are two reasons why I decided to enroll in Petroleum and Natural Gas Engineering, one is the people that make up the program and two is the opportunity that is out there.

… a high ranking executive at a major company once said that the reason why he is in the position that he is in today, is because someone “believed in me and that made all the difference.” The department believes in its students and from my point of view that made all the difference in my life.

… the jobs are out there and the industry, along with the country, needs graduates in the oil and gas business to succeed. West Virginia University and the Department of Petroleum and Natural Gas Engineering should stand as the foundation for reinventing the oil and gas industry.“

Dan Tomley,
Class of 2000
Testimonial from Past Graduates

“Working for ChevronTexaco is an exciting and rewarding experience. In my three years with the company, I have had assignments in both Petroleum Engineering and Information Technology where I have worked on challenging projects, learned from leaders in our industry, and used world-class processes to achieve high performance. I attribute this success to my education at West Virginia University for providing me with the principles and knowledge of Petroleum Engineering, particularly Dr. Shahab Mohaghegh for encouraging me to explore new technologies and teaching me the intrinsic value of information.”

Carrie Goddard, Class of 2000
Testimonial from Past Graduates

Chris Hopkins, Class of 1984

Schlumberger