International Experience in Energy, Environmental and Chemical Engineering: India 2019-2020

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The International Experience

In order to gain experience in topics of engineering through a global context the Washington University St. Louis Energy, Environmental, and Chemical Engineering Department offers the International Experience in Engineering.

With help from McDonnell Academy Global Energy and Environmental Partnership (MAGEEP) nine student and two faculty members spent the days between December 28th and January 8th in Delhi, India visiting the sister institution Indian Institute of Technology Delhi. (IITD)

We spent our time on campus meeting students, attending lectures, and visiting labs.
Citizen’s Amendment Bill

- A controversial bill that was actively being protested while we were in Delhi

- The bill gives citizenship to people of non-Muslim faiths faster than those that are Muslim

- People against the bill, protested that it goes against India’s secular nature, established in their Constitution
Cultural Experiences
Getting There
Our First Evening

After our tiring trip to India and a long wait for our room keys we went straight to the C2 Block for dinner.
Trip to Agra
Taj Mahal
Agra Fort
New Year’s Eve

Spent the night at the Shyama Hotel

Air quality levels that night.
Dinner at local mall, trying some Burmese food
Group dinner at the Hyatt regency Delhi
Humayun’s Tomb
Group photo in front of Humayun’s tomb
Isa Khan’s Tomb
Red Fort, Delhi
Rickshawing through Old Delhi
Sarojini Market
Gandhi Museum
Sunder Nursery with IIT Students Jaykant and Shritik
Educational Experiences
Educational System

- Very similar to the US education system, IIT’s were developed with help from Massachusetts Institute of Technology

- Education is a right, meaning if you can pass the entrance exam for the college you will be able to attend no matter your family’s income status

- You only get two chances to take the entrance exam to get into IIT, if you don’t pass you don’t get the opportunity to go
Presenting a plaque of appreciation from Washington University to IIT Delhi
IIT Delhi club tours
Dinner with Faculty and Students
Walking around the IIT Delhi campus
Classroom Pictures
Lab Tours
Air Pollution & Mitigation

Dr. Divesh Bhatia - Pollution Control from Automobiles
- Primary emission sources, cold start emissions & catalytic converters

Dr. Vikram Singh - Air Pollution
- Sources of air pollution such as waste burning & brick industry, and aerosol removal mechanisms (dry and wet deposition)

Dr. Sagnik Dey - Air Quality Management in India: Opposition & Challenges
- Air pollutions patterns over entire country, iar quality & policy making, interdisciplinary nature of air pollution
Tour of HR-ToF-AMS Lab rooftop monitoring devices
Pollution and Transport Research

Dr. Shantanu Roy - Application of Radioisotope Techniques in CFD Validation, Design, Scale-up & Troubleshooting

- Fluidized bed reactor, radioactive tracer particles and monitoring internal problems of a closed reactor

Dr. K. K. Pant - Research Lab at IITD

- Various solutions to make electricity more clean, circulating emissions from a reactor to make fuel
Experimental multi-phase flow systems
Laser Tracking System for Multiphase Flow
Biomolecules & Biotechnology

Dr. Anurag S. Rathore - Introduction to Pharmaceutical Technology

- Emerging technologies such as tumor-destroying nanobots and difference in the affordability in medicine

Dr. Gaurav Goel- Multiscale Modeling of Protein Folding and Aggregation

- Simulations for protein folding used for development of a protein that inhibits a certain type of aggregation for an insulin protein
New Tools to Problem Solution

Dr. Hariprasad Kodamana - An introduction to Process Data Analytics
- Running simulations that can validate actual experiments and an introduction to machine learning and its simulation power

Dr. Ali Hader - Linking Nanotechnology, Climate Change, and Renewable Energy Using Sustainable Catalysis
- The importance of catalysts, optimizing catalysts through machine learning using binding energies
New Frontiers for the Future

Dr. MKS Verma - Battery Management System for Electric Vehicles (EVs)
- A battery’s ability to hold charge, various methods for charge measurement and using computational models for this application

Dr. Manjesh Kumar - Rational Design of Nanoporous Catalyst
- Optimization of the properties of a catalyst and the challenges in its synthesis

Dr. Anil Verma - Renewable Energy Conversion and Storage: Electrochemical Devices
- Carbon dioxide to fuel products using sustainable energy and the closed loop flow battery
Closed Loop Flow through Battery
Air Quality Monitoring System - Major Dhyanchand Stadium, India Gate
The miniature air monitoring device that Washington University in St. Louis helped develop.
Indian Institute of Tropical Meteorology (IITM)
Group photo in front of the Indian Institute of Tropical Meteorology