



Integrative Graduate Program in Sustainable Electric Energy Systems

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UNAPEC



UPRM AND THE ECE DEPARTMENT

UPRM: Land Grant College – 1911

- 12,000 students
- 4,500 in Engineering: Hispanics, Female 30%

ECE Department - 1928

- 1,400 students, 50 professors
- Five year ABET accredited programs



Power and Energy at UPRM

Ten Power professors

- # Alumni: ASU, Iowa State, MIT, Ohio State, RPI
- # Two IEEE/PES Walter Fee Awards
- # NSF PECASE and CAREER Awards

Over 150 power engineering students

- # Over 40 UG students graduating each year

Multi-disciplinary collaborations

International links

- # Collaborations with universities and labs in U.S., Latin America and Europe
- # Graduate Students from South and Central America

Dominican Power System

- # Private power producers and one private distribution company.
- # The government owns all hydroelectric generation, the transmission system and two sections of the distribution systems.
- # National Energy Commission (energy policy)
- # Energy Office (regulator)
- # Coordinating Office (ISO-like entity)

Dominican Power System

- # Need workforce that understands and is capable of solving market-related challenges
- # Puerto Rico and the Dominican Republic have an education collaborative agreement
- # Team of UPRM professors visited the Dominican Republic to study their system and their needs

Visits



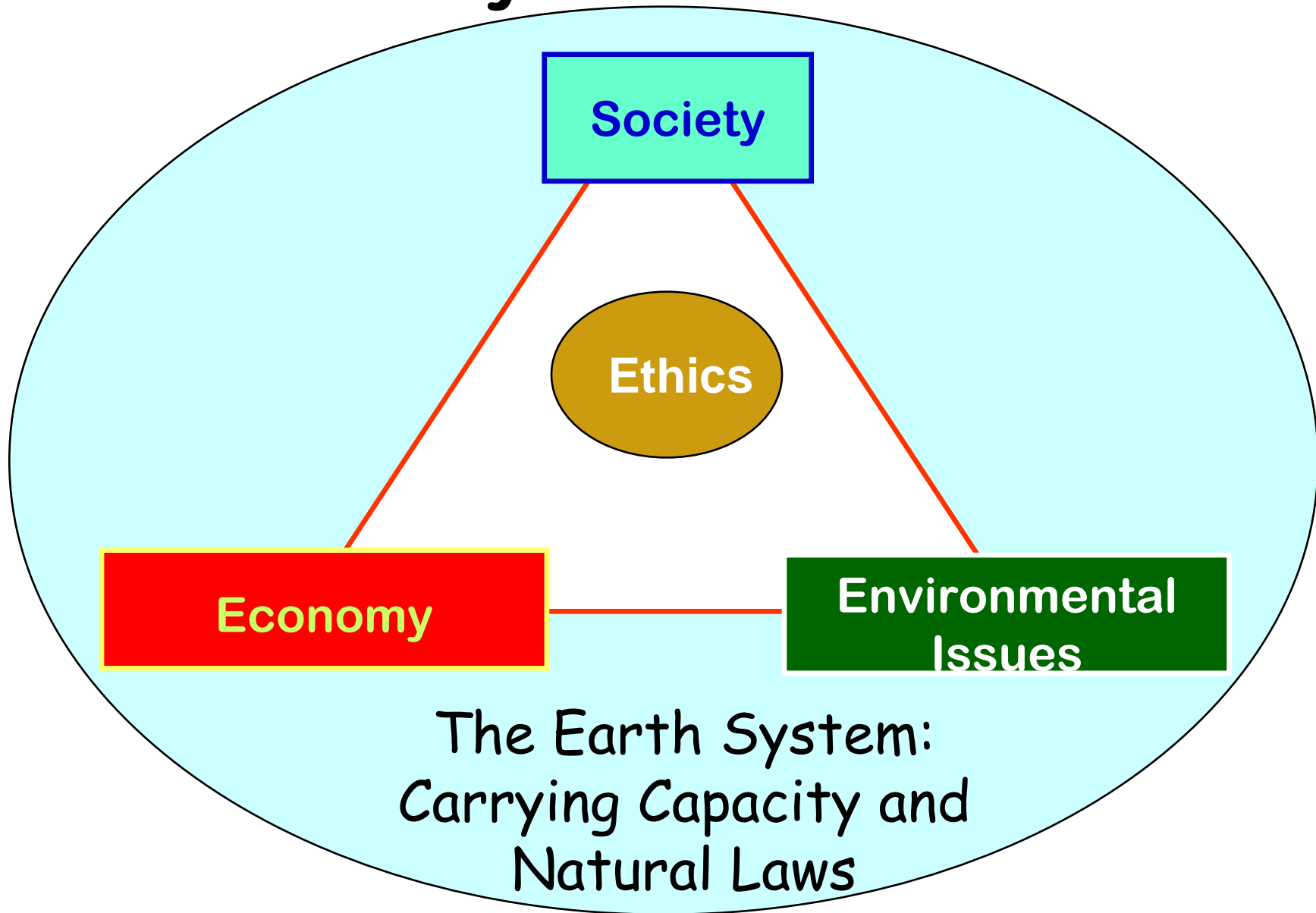
- # UNAPEC
- # CCE
- # EDESUR
- # Hydro plants
Monción & Taveras
- # AES – Andrés
- # ITABO
- # Coordinating Office
- # Energy Office



Workforce development program

- # Pilot education project that could serve as a model to other countries in Latin America.**
- # A sustainable energy framework was proposed to structure a professional Masters program.**
- # Not only traditional power engineering courses, but also account for the social context of the Dominican power industry**
- # Distance learning technology**

Sustainability



Sustainable Energy



Courses

Sustainable Energy

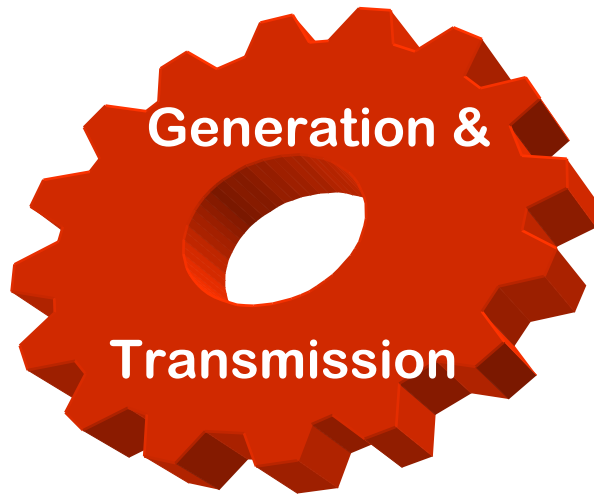
Renewable Energy Systems

Energy and Society

Bio-energy



Courses



Power Systems Generation and Control

Power Systems Dynamics

Reactive Power



Courses



Energy Markets

Power System Economics



Courses



Power System Protection

Distribution Systems Planning

**Special Topics:
Power Electronics in Power Systems**



Professional Masters Program

- # Started in January 2007 with 27 engineers mostly from the state-owned transmission company.
- # Selection process by UPRM professors
 - # Interviews
 - # Evaluation of academic records
- # Refresher course in power system analysis and an introduction to computational tools

Course Structure

- # Each course has a 25-hour lecture format, followed by a 15-hour supervised independent study
- # Delivered in real-time, from UPRM to UNAPEC, using videoconference, (twice a week)
- # During the 15-hour independent study period students report to the professor on their progress on the final work
- # After the 11 courses, each student must complete a Masters Project.

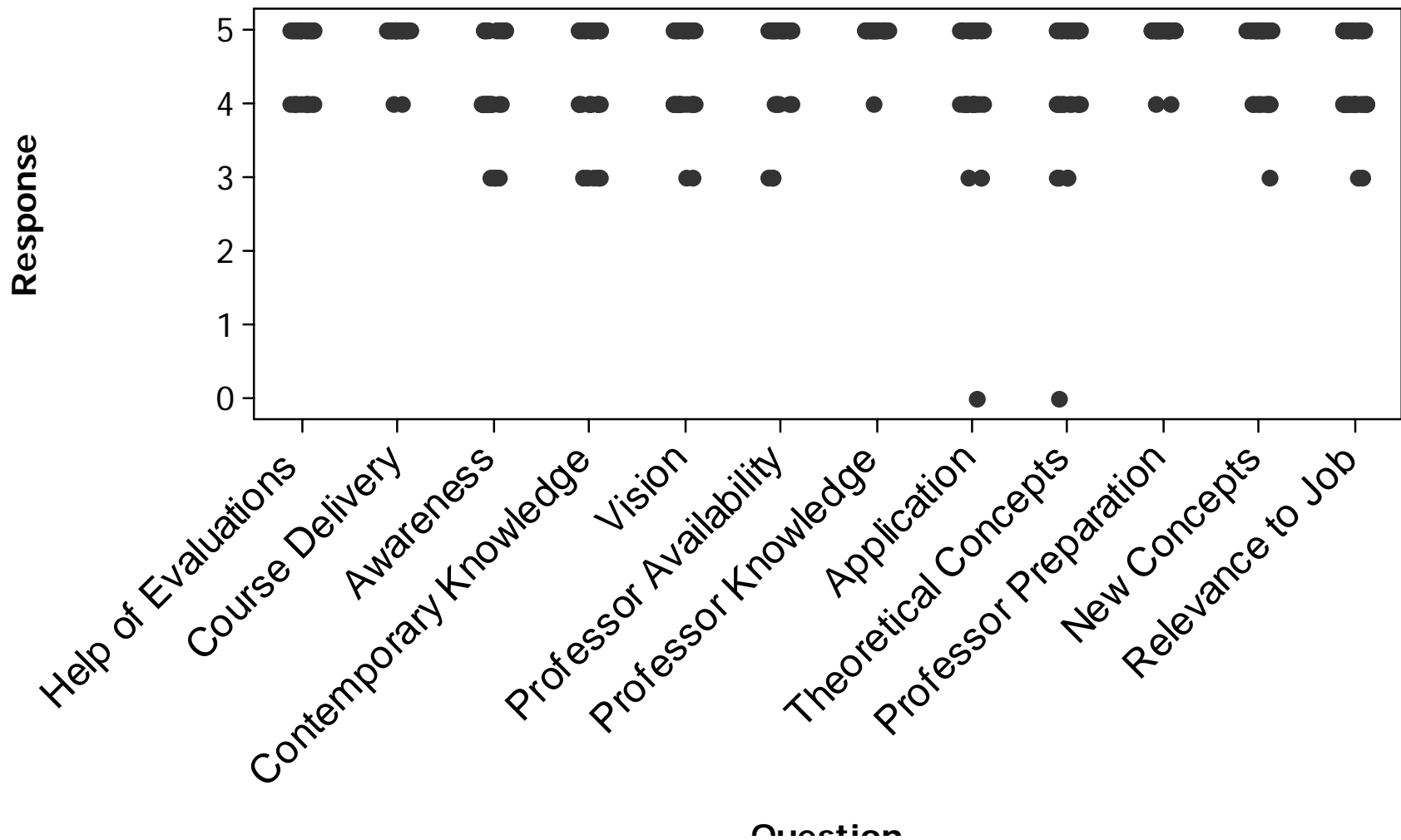
PROGRAM SUMMARY

| Category | Number of credits |
|---------------------------------------|--------------------------|
| Refresher course (UNAPEC) | 6 |
| Courses (UPRM) | 33 |
| Project (UPRM-Industry Mentor) | 3 |
| Total | 42 |



Assessment

Individual Value Plot of Response vs. Question



Conclusions

- # A new Masters program in Sustainable Energy Systems was developed in response to the power workforce challenge faced in the Dominican Republic.
- # The power workforce challenge is beyond traditional educational approaches, a more holistic framework is needed to prepare engineers to face the socio-economic challenges of the 21st Century.
- # Programs need to address particular needs of the region or country
- # Sustainability presents an opportunity to create a new paradigm in the professional development of power engineers in the Americas



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