Universidad de Puerto Rico
Colegio de Agricultura y Artes Mecánicas
SENADO ACADEMICO DE MAYAGUEZ
Mayagüez, Puerto Rico

Certificación Núm. 65-67-4

Yo, Juan Suárez Morales, Secretario del Senado Académico de Mayagüez, CERTIFICO:

Que en reunión celebrada por este organismo el día 15 de octubre de 1965, se acordó aprobar el Programa de Estudios Graduados conducente a la Maestría en Ciencias en Ingeniería Eléctrica, sujeto a que su implantación será determinada por la dirección universitaria.

Se acompaña copia del Programa hacia la Maestría en Ciencias en Ingeniería Eléctrica.

Y para remitir a las autoridades correspondientes, expido la presente en Mayagüez, Puerto Rico, a 26 de octubre de 1965.

Juan Suárez Morales
Secretario

CE-67-X

CERTIFICACION NUM.
64-65-369

UNIVERSIDAD DE PUERTO RICO
Colegio de Agricultura y Artes Mecánicas
Mayaguez, Puerto Rico

Junta Universitaria

Yo, Domingo Silás Ortiz, Secretario de la Junta Universitaria de Mayaguez, CERTIFICO:

Que la Junta Universitaria de Mayaguez en reunión del 24 de mayo de 1965 tomó, entre otros, los siguientes acuerdos:

1- Aceptar, en principio, una propuesta para un programa hacia la Maestría en Ciencias en Ingeniería Eléctrica, según detalle que se acompaña en forma mimeografiada.

2- Referir el programa mencionado al Senado Académico para consideración y estudio.

Y para remitir a las autoridades correspondientes expido la presente en Mayaguez, Puerto Rico, hoy, 25 de mayo de 1965.

DOMINGO SILAS ORTIZ
Secretario

# PROPOSAL FOR GRADUATE STUDIES LEADING TO THE DEGREE OF MASTER OF SCIENCE IN ELECTRICAL ENGINEERING

## INTRODUCTION:

The 'Department of Electrical Engineering has developed to the point where it is desirable to devote serious consideration to the establishment of graduate studies. Thus it is hereby proposed that a Master of Science Program be established following the general pattern of other programs offered at the College of Agriculture and Mechanic Arts, and leading to the degree of Master of Science in Electrical Engineering.

## OBJECTIVES:

1. -To provide opportunities and facilities for graduate studies and research in Electrical Engineering to qualified applicants.

2. - To stimulate and promote research within our Faculty.

3. - To undertake the development of specific devices which will improve the competence of teachers and students.

## ADMISSION REQUIREMENTS:

Admission to graduate studies is granted by the Graduate Council upon the recommendation of the Electrical Engineering Department, and is based primarily on the applicant's undergraduate record.

In addition to the conditions required by the Graduate Council for admission to Graduate Studies the applicant must possess a Bachelor of Science degree in Electrical Engineering , and must be fluent in Spanish and English.

## GRADUATE COURSES OFFERED IN ELECTRICAL ENGINEERING

EL EG 551. ELECTRIC POWER CIRCUITS. Three credit hours. Two two-hour lecture conputation periods each week. Prerequisite: EL EG 402.

EL EG 552. ENERGY CONVERSION. Three credit hours. Three lecture-discussions each week. Prerequisite: EL EG 422.

EL EG 578. ACOUSTIC ENGINEERING. Three credit hours. Two lecture-discussions and one three-hour laboratory each week. Prerequisites: Phys 202 and Math 222.

EL EG 599. SPECIAL PROBLEMS. One to three credit hours. One to three laboratories each week.

EL EG 602. INTRODUCTION TO NON-LINEAR CONTROL SYSTEM. Three credit hours. Three lecture-discussions each week.

EL EG 603. INERTIAL NAVIGATION AND GUIDANCE. Two credit hours. Two lecture discussions each week.

EL EG 604. THEORY OF MICROWAVE DEVICES. Three credit hours. Two lectures and one three-hour computation period each week.

EL EG 605. THEORY OF OSCILLATIONS OF NON-LINEAR SYSTEMS. Three credit hours. Two lecture-discussions and one three-hour computation period each week.

EL EG 607. PROPAGATION OF ELECTROMAGNETIC WAVES BY AN IONIZED MEDIUM. Three credit hours. Three lecture-discussions each week.

EL EG 608. SPECIAL TOPICS IN ADVANCED A. C. MACHINERY. Three credit hours. Two lectures and one two-hour computation period each week.

EL EG 610. ELEMENTS OF STATISTICAL COMMUNICATION THEORY. Three credit hours. Three lecture-discussions each week.

EL EG 699. MASTER THESIS. One to six credit hours. One to six research periods each week.

# FACULTY MEMBERS AVAILABLE FOR THE PROGRAM OF M. S. IN ELECTRICAL ENGINEERING

Following is a condensed curriculum vitae of the Faculty members of the Electrical Engineering and Physics Department of the College of Agriculture and Mechanic Arts at Mayaguez who can participate in the graduate program.

This list is presented to give an idea of the wide variety of scientific training received by our Faculty and to show the possibility of offering a graduate program with our available Faculty.

Graduate courses offered in other departments will be accepted in this program if they are related to the thesis work of the students.

Name: José Luis Colón Díaz

Education:

B.S.E.E. University of Puerto Rico-1963

M.E.E. RensselaerPolytechnic Institute -1964

Thesis: Anisotropy Distribution in Thin Magnetic Films

Professional and Honorary Societies:

I.E.E.E.

Name: Braulio Dueño Leary

Education:

B. S. E. E. University of Alabama -1930

M. A. University of Alabama -1931

Ph. D. University of Cornell -1955

Thesis: Study and Interpretation of Low-Angle Fluctuations from Radio Star Cassiopeia.

Teaching Experience:

30 years

Professional and Honorary Societies:

I. E. E. E.

Colegio de Ingenieros de Puerto Rico

American Geophysical Union U. R. S. I. Comm. 11

Publications:

1. Peculiarities and Seasonal Variations of Transequatorial Backscatter Echoes as Observed at Mayaguez, Puerto Rico, Journ. of Geoph. Res., Vol. 65, No. 6, June 1960
2. Measurement of Ionospheric Drift by Radio-Star Observations, Journ. of Geoph. Res., Vol. 66, No. 8, August 1961.
3. Sporadic E as Observed from Mayagues, Puerto Rico by Backscatter Sounders Ionospheric Sporadic E., Vol. 11, Chapter of a book published by Pergamon Press Lt., Oxford, 1963.
4. Interpretation of Some Sweep-Frequency Backscatter Echoes, Journ. of Geoph. Res., Vol. 68, No. 12, June 15, 1963, Internal publication, limited distribution.

Publications: (Cont'd)

5. Detection of Apparent Ionospheric Movements by Backscatter Techniques, July 8, 1964. Internal publication, limited distribution.
6. Ionospheric Propagation Studies, Final Report, June 1, 1964. Internal publication, limited distribution.
7. Improved Frequency Synthesizer and Frequency Standard Calibrator, March 1964. Internal publication, limited distribution.
8. Low-Angle Fluctuations of the Radio-Star Cassiopeia and its Relation to the Incidence of Sporadic E., Journ. of Geoph. Res. Vol. 61, No. 3 p. 535.
9. Observation of Correlated Frequency Fluctuations of WWV-20 and PR-17 as Received at Stanford University. Report with K. L. Chan and O. G. Villard, Radioscience Laboratory, Stanford University.
10. Motion of Irregularities Deducted from Backscatter, paper presented at AGARD meeting, August 26-29, 1964, Copenhagen, Denmark.

Name: Luis E. Fiol Martínez

Education:

B. S. E. E. University of Puerto Rico -1947

M. E. E. Rensselaer Polytechnic Institute -1960

Thesis : Design of a Wireless Earphone For Hearing Aids

A. S. E. E. Summer Institute Nuclear Engineering Cornell University -1961

Industrial Experience:

Consulting Engineer: 2 years as Chief Elec. Eng. -Eduardo L. Saldaña & Co.

General Consulting Engineer.

Teaching Experience:

12 years teaching experience

Professional and Honorary Societies:

Colegio de Ingenieros de Puerto Rico

I. E. E. E.

A. S. E. E.

Name: Henry Fischbach Nazario

Education:

B.S.E.E. University of Puerto Rico -1956

M.S.E.Ph. Cornell University -1959

Thesis: Investigation of Some Properties of a Corona Counter for Fast Neutron Detection

Summer Institute of Reactor Technology, Argonne National Laboratory -1959

Summer Institute on Rocketry, Stanford University-1960

Summer Institute of Space Technology, University of Pennsylvania-1961

Industrial Experience:

Consulting Engineer: consulting work with radio stations.

Teaching Experience:

7 years

Professional and Honorary Societies:

I.E.E.E.

A.S.E.E.

Name: José Luis García de Quevedo

Education:

B.S.E.E. University of Puerto Rico-1939

M.E.E. Rensselaer Polytechnic Institute -1940

Thesis: Design of the Final Stage of a Satellite Transmitter, 1940

Ph. D. Duke University -1948

Thesis: Frequency Stabilization of Microwave Oscillators by Means of Spectrum Lines, 1948

A.S.E.E. Summer Institute on Nuclear Engineering, Brookhaven National Laboratory -1956

Summer Institute 1957-Reactor Physics, Oak Ridge.

U.C.L.A. X-ray Crystallography - 1957

Industrial Experience:

Engineer, Howard P. Holey Co., Summer 1942

Physicist, Radiation Inc. Summer 1952

Physicist, California Research Corp., 1956-1957

Teaching Experience:

23 years

Professional and Honorary Societies:

I.E.E.E. Senior Member

American Physical Society, Member

Sigma Xi, Member

Colegio de Ingenieros de Puerto Rico, Member

Sociedad de Ingenieros Electricistas de Puerto Rico, Member

Publications:(Cont'd)

1. Frequency Stabilization of Microwave Oscillators by Spectrum Lines, Journal of Applied Physics, Vol. 18, No. 12, pp. 1112-1115, Dec. 1947.
2. Frequency Stabilization of Microwave Oscillators by Spectrum Lines II, Journal of Applied Physics, Vol. 19, No. 9, pp. 831-836
3. Double Modulation System for Narrowing Electron Resonance Absorption Lines, The Review of Scientific Instruments, Vol. 28, No. 8, pp. 616-619, August, 1957.

Name: Julio A. Gonzalo González

Education:

University of Madrid - Licenciature in Physics -1954-1959

University of Madrid - Revalidation Examination (M.S.) -1959

University of Madrid - Solid State and Theoretical Physics (Ph. D) 1959-1962

Thesis: Estudio crítico de la teoría acerca de la Ferroelectricidad en cristales de tipo penovskita, Universidad de Madrid, 1961.

University of Florida - Winter Institute in Quantum Chemistry and Solid State Physics (Dec. 1962-Jan. 1963)

Teaching Experience:

6 years

Professional and Honorary Societies:

Asociación Nacional de Físicos de España (ANFE)

Sigma Xi Club

Publications:

1. Thermal Hysteresis in Barium Titanate, submitted to Phys. Rev.
2. New formulation of potential well model for $BaTiO_3$ and its relationship with Devonshire's phenomenological theory (to be submitted to J. of Phys. and Chem. of Solids)

Name: Teodoro Mercado Jiménez

Education:

B. S. E. E. University of Puerto Rico -1957

M. S. E. University of Michigan -1961

Ph. D. Texas A & M University -1965

Thesis: An Analysis of a Distributed Lag System With Resistive Terminations

Teaching Experience:

8 years

Professional and Honorary Societies:

I. E. E. E.

Eta Kappa Nu

Name: Roberto Ortiz Muñiz

Education:

B.S.E.E. University of Puerto Rico -1938

M.S. Inst. Eng'g. University of Michigan -1954

Industrial Experience:

Consulting Engineer: Fairbanks Morse & Co.

Teaching Experience:

24 years

Publications:

High Speed Weighing System (Unpublished report to Fairbanks Morse & Co.)

Quadrature Suppression in Servo Mechanism (Unpublished report to Fairbanks Morse & Co.)

Name: Werner P. Umbreit

Eduacation:

B.S. Oscar Von Miller Polytechnikum, Munich, Germany, 1946

Ph. D. Bristol University, England- 1963

Thesis: Measuring of Transient Rotary Acceleration

Industrial Experience:

17 years experience in industry.

Teaching Experience:

8 years

Name: Miguel Wiewall Sánchez

Education:

B.S.E.E. Rensselaer Polytechnic Institute -1927

M.A. Columbia University -1934

M.S.E. Harvard University -1936

D.Sc. Harvard University -1938

Thesis: Distributed Capacities of Communications Transformers at Audio Frequencies.

Reactor Control Institute, Argonne National Laboratory, Chicago, Ill.

Summer of 1958

Industrial Experience:

Design of Electrical Installations, Roosevelt Housing Project, Mayaguez P.R., Measurement of antenna impedances and maintenance consulting work for various radio stations in P. R.

Teaching Experience:

33 years

Professional and Honorary Societies:

American Society for Engineering Education.

I.E.E.E.

Colegio de Ingenieros de Puerto Rico

Publications:

1. Study of Ionospheric Winds Additional Data on the Determination of Ionospheric Drift and Turbulence from Radio Fading Records, Scientific Report #6.
2. Final Report of Contract No. AF 19 (604)-2036 with Air Force Cambridge Research Laboratories. 192 pp. Mayaguez, P. R.

Name: Florencio Vázquez Martínez

Education:

High School: Colegio P. P. Agustinos (León-España) 1955

Escuela Especial de Ingenieros Aeronáuticos -Madrid- 1954

Ph. D. Escuela Especial de Ingenieros Aeronáuticos, Madrid- 1962

Curso de electrónica Nuclear: Junta de Energía Nuclear-Madrid-1961

Teaching Experience:

10 years

Professional and Honorary Societies:

Asociación de Ingenieros Aeronáuticos (España)

Asociación de Ingenieros Civiles (España)

Name: Alejandro Rivera Irizarry

Education:

B. S. E. E. University of Puerto Rico -1949

M. S. N. T. University of Puerto Rico -1958

A. S. E. E. Summer Institute on Reactor Control, Argonne National Lab., 1958

A. S. E. E. Advanced Institute on Reactor Control, Argonne National Lab., 1959

Industrial Experience:

P. R. W. R. A. -as power lines construction engineer

Teaching Experience:

6 years

Professional and Honorary Societies:

A. S. E. E.

Colegio de Ingenieros de Puerto Rico

Sociedad de Ingenieros Electricistas de Puerto Rico

Name: Hiram E. Puig Ferreira

Education:

B.S.E.E. University of Puerto Rico -1960

M.S.E. University of Michigan -1962

Teaching Experience:

2 years

Instructor of Physics, Inter american University, San Germán Puerto Rico

Summer 1963-1964

Research Assistant in the University of Michigan for the Institute of Science and Technology.

Professional and Honorary Societies:

I.E.E.E.

Publications:

1. A method for Estimating Systematic Gyro Drift Using External Position Fixes.
2. Autocorrelation Function of a Free Gyro Drift Rate. (Both articles published in a research program carried out by the I.S.T. for F.A.A. They were never published for the public.)

Name: Osvaldo Porrata Doria

Education:

B. S. E. E. University of Puerto Rico -1933

M. A. Colombia University (Mathematics)- 1938

Thesis: A Special Relative Conformal Invariant of a Curvilinear 60-degree angle

M. E. E. Rensselaer Polytechnic Institute -1941

Thesis: An Investigations of a Circuit for An Electronic Tachometer

Industrial Experience:

15 years part-time industrial and audio consulting

Teaching Experience:

30 years

One year at Polytechnic Institute of Brooklyn toward D. E. E.

Professional and Honorary Societies:

Sigma Xi

A. S. E. E.

I. E. E. E.

Colegio de Ingenieros de Puerto Rico

Sociedad de Ingenieros Electricistas de Puerto Rico

Publications:

1. Three General Formulas for the Self GMD of Stranded Conductors, Electrical Engineering, Nov. 1941
2. Stereo and Your Environment, Hi Fi Review, Jan., 1960
3. Pseudo-Stereo and Your Monaural Recordings, Revista del Colegio de Ingenieros, Oct., Nov., Dec., 1960
4. Balancing Your Stereo System, Revista del Colegio de Ingenieros, Jan., Feb., March, 1961

Name: Eddie Ortiz Muñiz

Education:

B.S. University of Puerto Rico -1943 (Mathematics)

M.S. Agricultural and Mechanical Arts of Texas -1948 (Physics)

Ph.D. Agricultural and Mechanical College of Texas -1950 (Physics)

Thesis: Analysis of the Violet Absorption Spectrum of the Dioxide and Calculations of Molecular Constants.

Courses in Electronics and High Frequency at BPI - 1953

Nuclear Engineering Summer Institute at Brookhaven -1956

Nuclear Reactor Theory, Summer Institute at ORINS-1957

Industrial Experience:

Project Engineer, Sperry Gyroscope High Frequency Tube Division at Great Neck, Long Island - 1953 - 1955.

Ionospheric Project, Ramo Wooldridge Co., College of Agriculture

Teaching Experience:

22 years

Professional and Honorary Societies:

President-Elect, American Association of Physics Teachers, Section of Puerto Rico -1959-1962

American Nucleonics Society

American Association of Physics Teachers

Institute of Radio Engineers

Phi Kappa Phi

Sigma Pi Sigma

Sigma Xi Club

Publications:

1. Computation of the Moment of Inertia of Various Bodies by the Approximate Sum of Numerical Seires, Am. J. of Ph. 21, 11-14 (1953).
2. Electromagnetism Using Lagranges Trigonometric Identity, Am. J. of Ph. 140 (1953).
3. Set-up for the Vibrating Wire Experiment, Am. J. of Ph. 21,323 (1953).
4. Measurements of Microwave Local-Oscillator Noise, Proceedings National Electronic Conference, Vol. 9, February 1954.
5. Vibrational Analysis of $ClO_2$ System, Molecular Spectroscopy 1-81-94 (1957).
6. Design and Theoretical Calculations of Performance of the Sub-Critical Reactor of the Puerto Rico Nuclear Center (Unpublished)
   Summer Meeting of the American Association of Physics Teachers, University of Colorado and National Bureau of Standards, Boulder, Colorado.
7. Instructional Laboratory Experiments with a Neutron Source (Unpublished)
   Twenty Ninth Annual Meeting of A. A. P. T. at New York.
8. Beta Spectra with Plastic Scintillator (Co-author with W. Miller)
   Twenty Ninth Annual Meeting of A. A. P. T. at New York.
9. Compton Spectra (Co-author with W. Miller) - Twenty Ninth Annual Meeting of A. A. P. T. at New York.
10. Students Method for Determining the Binding Energy of the Deuteron - American Journal of Physics, October, 1961.

Publications:

11. An Inelastic Neutron Scattering Experiment-American Journal of Physics, September 1962.
12. Graphical Method for Determining the Minimum Critical Mass of a Bare Homogenous Reactor-Submited for Publication American Journal of Physics; Anneliese de Kraft; Eddie Ortiz
13. High Energy Gamma Photons-Neutron Conversation Device for Half Life Measurements, -Submitted for Publication American Journal of Physics: Santiago Pinto-Vega, Eddie Ortiz, Juan Facetti.

PERIODICALS AVAILABLE IN THE LIBRARY ON ELECTRICAL ENGINEERING OR RELATED FIELDS

| | From | To |
|---|---|---|
| American Institute of Electrical Engineers-Journal | 1928 | 1930 |
| American Institue of Electrical Engineers-Transactions | 1884 | 1962 |
| American Journal of Physics | 1945 | 1964 |
| Applied Science and Technology Index Formerly; Industrial Arts Index | 1948 | 1964 |
| Automation and Remote Control | 1964 | |
| Automation Express | 1960 | 1964 |
| Bell Laboratories Record | 1936 | 1964 |
| The Bell System Technical Journal | 1935 | 1964 |
| Canadian Journal of Physics | 1959 | 1964 |
| Ciencia e Investigación | 1945 | 1964 |
| Control Engineering | 1959 | 1964 |
| Datamation-Fomerly:Magazine Datamation Research and Engineering | 1955 | 1964 |
| Electrical Communication | 1946<br>1961 | 1959<br>1964 |
| Electrical Construction and Maintenance | 1953 | 1964 |
| Electrical Engineer | 1931 | 1963 |
| Electrical Review | 1948 | 1964 |
| Electrochenical Society Journal | 1957 | 1964 |
| Electronic Age-Summer | 1961 | 1964 |

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|---|---|---|
| Electronical Engineering | 1946 | 1964 |
| Electronics | 1931 | 1964 |
| Electronics Express | 1960 | 1964 |
| Electronics World-Formerly: (Radio and Television News; Radio News) | 1957 | 1964 |
| Engineering | 1959 | 1964 |
| Franklin Institute-Journal | 1959 | 1964 |
| Geophysical Journal | 1959 | 1963 |
| Geophysics | 1957 | 1963 |
| IBM. Journal of Research & Development | 1962 | 1963 |
| El Ingeniero Westinghouse | 1944 | 1964 |
| Institute of Radio Engineers-Proceedings | 1932 | 1964 |
| Institute of Radio Engineers-Transactions | 1962 | 1964 |
| Institute of Radio Engineers Antennas and Propagation | 1956 | 1964 |
| Instruments and Automation | 1954 | 1964 |
| Instruments and Experimental Techniques | 1954 | 1964 |
| Journal and Applied Physics | 1939 | 1964 |
| Journal of Atmospheric and Terrestrial Physics | 1950, 51, Nov. 1962, | 1955-61 1964 |
| Journal of Geophysical Research | 1950-52 | 1959-1964 |
| Journal of Nuclear Energy | 1956 | 1964 |
| Journal of Nuclear Physics | 1960 | 1963 |
| Journal of Nuclear Materials | | |
| Journal of Solar Energy | 1964 | only |

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|---|---|---|
| Materials: Research and Standards | 1961 | 1964 |
| Mathematics Computation-Formerly: Mathematical Tables and other Aids to Computation | 1966 | 1964 |
| Measurement Techniques | 1961 | 1964 |
| Missiles and Rockets | 1968 | 1964 |
| Nature | 1932 | 1964 |
| Nuclear Instruments and Methods | 1959 | 1963 |
| Nuclear Science and Engineering | 1956 | 1963 |
| Philosophical Magazine | 1959 | 1960 |
| Physical Review | 1913 | 1964 |
| Physical Society-Proceedings London | 1959 | only |
| Power | 1928 | 1964 |
| Power Engineering-Formerly: Power Generation | 1948 | 1956 |
| RCA Review | 1952 | 1964 |
| Radiation Reserch | 1959 | 1963 |
| Radio Electronic-Formerly Radio Craft | 1947 | 1957 |
| Research and Engineering | 1956 | 1957 |
| Research Engineer | 1960 | 1963 |
| Radio Electronic-Formerly: Radio Craft | 1947 | 1957 |
| Research and Engineering | 1956 | 1957 |
| Research Engineer | 1960 | 1963 |
| Review of Scientific Instruments | 1930-1962 | 1964 |
| Royal Society-Proceeding-Series A-Mathematical and Physical Science | 1959 | 1960 |
| Vector | 1964 | |
| Technical Disclosure Bulletin | 1964 | |