

AC 2009-2235: INTERNATIONAL ENGINEERING EDUCATION PROGRAM OFF LIMITS

Melany Ciampi, Organization of Researches in Environment, Health and Safety

Dr. Melany M. Ciampi is Professor of Electrical and Computer Engineering; President of Organization of Researches in Environment, Health and Safety (OPASS), Vice-President of Council of Researches in Education and Sciences (COPEC), Vice-President of Fishing Museum Friends Society (AAMP) and Vice-President of (Brazilian) National Monitoring Committee of "Internationale Gesellschaft für Ingenieurpädagogik" (IGIP). She is Vice Chair of Working Group "Ingenieurpädagogik im Internationalen Kontext" in "Internationale Gesellschaft für Ingenieurpädagogik" (IGIP), Member of Administrative Committee of Education Society of the Institute of Electrical and Electronics Engineers, Inc (IEEE-EdSoc) in USA and Council Member of "International Council for Engineering and Technology Education" (INTERTECH). She was President of Brazilian Chapter of Education Society of the Institute of Electrical and Electronics Engineers, Inc (IEEE-EdSoc), State Councilor of SBPC - Brazilian Association for the Advancement of Science and Manager of International Relations of SENAC School of Engineering and Technology. She is Member of IGIP (International Society for Engineering Education), SEFI (European Society for Engineering Education), ASEE (American Society for Engineering Education), INTERTECH (International Council for Engineering and Technology Education) and RCI (Cartagena Network of Engineering). She was the first American woman who has received the title "International Engineering Educator" of IGIP. Dr. Melany M. Ciampi has coordinated and has participated of dozens of organizing committees of events in Brazil and abroad like: the Exhibits Chair of ICECE'99 (International Conference on Engineering and Computer Education), the Publications Chair of ICECE'2000, the General Secretary of CBPA'2001 and CBPA'2002 (Brazilian Congress of Environmental Researches), the Technical Program Chair of INTERTECH'2002 (International Conference on Engineering and Technology Education), of ICECE'2003, of WCETE'2004 (World Congress on Engineering and Technology Education), of GCETE'2005 (Global Congress on Engineering and Technology Education), of WCCSETE'2006 (World Congress on Computer Science, Engineering and Technology Education); of GCMM'2006 (Global Congress on Manufacturing and Management); of ICECE'2007, of INTERTECH'2008, of ICECE'2009, of INTERTECH'2010, of IGIP'2011 (International IGIP Symposium on Engineering Education), of CBPAS'2003, CBPAS'2004 and CBPAS'2005 (Brazilian Congress of Environmental Researches and Health), EHWC'2006 (Environmental and Health World Congress), SHEWC'2007 (Safety, Health and Environmental World Congress), SHEWC'2008, SHEWC'2009 and WCCA'2007 (World Congress on Communication and Arts) and WCCA'2009 and the International Chair of FIE'2003 (Frontiers in Education Annual Conference), FIE'2004, FIE'2005, FIE'2006, FIE'2008, FIE'2008, FIE'2009 and FIE'2010.

Claudio Brito, Council of Researches in Education and Sciences

Dr. Claudio da Rocha Brito is Professor of Electrical and Computer Engineering; President of Council of Researches in Education and Sciences (COPEC), President of Fishing Museum Friends Society (AAMP), President of (Brazilian) National Monitoring Committee of "Internationale Gesellschaft für Ingenieurpädagogik" (IGIP) and Vice-President of Réseau Carthagène d'Ingénierie (Cartagena Network of Engineering) and Organization of Researches in Environment, Health and Safety (OPASS). He is Chairman of Working Group "Ingenieurpädagogik im Internationalen Kontext" and Member of International Monitoring Committee in IGIP, Council Member of "International Council for Engineering and Technology Education" (INTERTECH), Member of Administrative Committee of Education Society of the Institute of Electrical and Electronics Engineers, Inc (IEEE-EdSoc) in USA, Board Member of "Global Council on Manufacturing and Management" (GCMM) and Director of Brazilian Network of Engineering (RBE/SP). He was President of Brazilian Chapter of Education Society of the Institute of Electrical and Electronics Engineers, Inc (IEEE-EdSoc), Secretary of Santos

region of SBPC - Brazilian Association for the Advancement of Science, Adviser for International Subjects of the Presidency of Brazilian Society for Engineering Education (ABENGE), Dean of International Relations of SENAC School of Engineering and Technology, Member of Executive Committee of Asociación Iberoamericana de Instituciones de Enseñanza de la Ingeniería – ASIBEI (Iberian-American Association of Engineering Education Institutions), Councilor of Urban Development City Council (CMDU) and Councilor of Economics Development City Council (CDES). He is Member of IGIP (International Society for Engineering Education), SEFI (European Society for Engineering Education), ASEE (American Society for Engineering Education), INTERTECH (International Council for Engineering and Technology Education) and RCI (Cartagena Network of Engineering). Dr. Claudio da Rocha Brito has received a B.S. degree in Electrical Engineering, B.S. degree in Mathematics, B.S. degree in Physics, M.S. and Ph.D. in Electrical Engineering all from the University of São Paulo. He is listed in "Who's Who in the World", "Who's Who in America", "Who's Who in Science and Engineering", "Five Thousand Personalities of the World", "Dictionary of International Biography", "Men of Achievement" and others similar publications. Although he was born in São Paulo City, he has received the title of Santos Citizen from Santos City Hall and he was the first American professor who has received the title "International Engineering Educator" of IGIP. Dr. Claudio da Rocha Brito has coordinated and has participated of dozens of organizing committees of events in Brazil and abroad like: General Secretary of ICECE'99 (International Conference on Engineering and Computer Education), the Technical Program Chair of ICECE'2000, the General Chair of INTERTECH'2002 (International Conference on Engineering and Technology Education), of ICECE'2003, of WCETE'2004 (World Congress on Engineering and Technology Education), of GCETE'2005 (Global Congress on Engineering and Technology Education), of WCCSETE'2006 (World Congress on Computer Science, Engineering and Technology Education); of GCOMM'2006 (Global Congress on Manufacturing and Management), of ICECE'2007, of INTERTECH'2008, of ICECE'2009, of INTERTECH'2010, of IGIP'2011 (International IGIP Symposium on Engineering Education), of CBPA'2001 and CBPA'2002 (Brazilian Congress of Environmental Researches) and CBPAS'2003, CBPAS'2004 and CBPAS'2005 (Brazilian Congress of Environmental Researches and Health), EHWC'2006 (Environmental and Health World Congress), SHEWC'2007 (Safety, Health and Environmental World Congress), SHEWC'2008, SHEWC'2009 and WCCA'2007 (World Congress on Communication and Arts) and WCCA'2009.

International Engineering Education Program off Limits

Melany M. Ciampi¹, Claudio da Rocha Brito²

¹ President of Organization of Researches in Environment, Health and Safety

² President of Council of Researches in Education and Sciences

Abstract

In order to accomplish the strategic plan of COPEC - Council of Researches in Education and Sciences, the engineering education research team has started to offer another Program: the International Engineering Educator Program. The goal is to improve the formation of the engineering educator providing her/him with all the competencies necessary to teach at the state of the art with the best available teaching technologies. As COPEC has already the IGIP National Monitoring Committee that provides the courses for engineering educators, and a large experience developing and implementing engineering programs, the engineering education research team has decided to develop and to offer a graduation level program for engineers dedicated to education. The curriculum follows the modular international engineering education curriculum that attends fully the education rules for the university level of formation in the country. It is a very dynamic and rich program, developed in modules, followed in several countries in the world. It follows the trend of global formation of professionals, mainly to attend the need of a prepared engineering educator to act in the several different cultural environments, which mobility has imposed as a fact of life for researchers and teachers at graduation level. New competencies of educators are needed such as: evaluation management; development competencies; communication skills; teamwork; ethics and intercultural competencies. This engineering education curriculum is a modular system which consists of: core modules (8 Credit Points), theory modules (4 CP) and practice modules (8 CP). Both the Register and the title provided by this Program recognized internationally are intended to improve the position, role and responsibility of engineering educators in society.

1. Introduction

The main idea is to develop a graduation program based on the ING-PAED IGIP's, which is an international organization that has been preparing engineers educators in Europe and now world wide, and offer to the engineers who teach in University. The main goal is to form engineers educators qualified to perform following the new trends in education.

It follows the patterns of IGIP registration for Engineering and Technology, the qualifications and professional experience at an advanced level. It follows the trend of global formation of professionals, mainly to attend the need of a prepared engineering educator to act in the several different cultural environments, which mobility has imposed as a fact of life for researchers and teachers at graduation level.

As COPEC has already the IGIP National Monitoring Committee that provides the courses for engineering educators, and a large experience developing and implementing engineering programs, the engineering education research team has decided to develop and to offer a graduation level program for engineers dedicated to education [1].

2. The profile of 21st. Engineering Educator

New competencies of educators are needed such as: evaluation management; development of competencies; communication skills; teamwork; ethics and intercultural competencies.

Basic research is recognized as an important element in the development of high technology. Universities are now recognized by the governments and industries as crucial to foster their development. The formation of good engineers and professionals in technological fields is fundamental for the governments, the industries and societies. The relevance of teaching practice is increasing in order to provide good teaching and guidance for the future professional, researcher or teacher [2].

The profile of an Engineering Educator is based on three fundamental premises:

- A solid base of disciplines of Sciences of Engineering is the basic demand for the professionals of Engineering and Technology fields dedicated to the Education. It follows the patterns of ING-PAED IGIP registration for Engineering and Technology, the qualifications and professional experience at an advanced level;
- A good knowledge about Education in Engineering is in the same way important and a course of appropriate training should be equivalent to one semester in university (a minimum of 200 hours) in content terms. Courses for engineering educators should be based on IGIP education model and curriculum for Engineering, and that are given by approved institutions;
- An additional demand for the registration is the minimum of a year of practical work as professionals in of Engineering and Technology area dedicated to the Education.

The formula for the title "ING-PAED IGIP" is:

$$\begin{array}{c} \text{Qualification in Engineering} \\ + \\ \text{Training of Education in Engineering and Technology} \\ + \\ \text{Practice in Engineering and Technology Education Area.} \end{array}$$

The engineering qualification should correspond preferably to "Europe Ingenieur (EUR-ING)" qualification for FEANI. In Brazil it follows the defined patterns for CFE/CREAs – Federal System of Engineering in the engineers' case and of the organizations responsible for the other professionals of Technology area.

3. Admission Requirements

Candidates requirements for admission and should have a bachelor's degree in science, engineering, or technology, or in such fields as computer science/engineering, electrical/ control engineering, industrial engineering, environmental engineering, manufacturing engineering, materials science and engineering, mechanical engineering, or management, etc.

Students with other backgrounds will be considered based on their interest, formal education and experience in teaching.

4. Course Information

The Master Degree in Engineering Education requires 30 credit hours of graduate studies. The 30 credits consist of a minimum of 12 credit hours of coursework, plus 12 credit hours of any combination of coursework, independent study, directed research or thesis that complies with the following constraints: if there is a thesis, it must at least 6 and no more than 12 credits; there can be no more than 9 credits of directed research; and the total number of credits from the Management Department cannot exceed 14 [3].

The minimum of 12 credit hours of coursework must include a minimum of two credits each in at least four of the seven core areas. The coursework should be selected in consultation with an advisor from the EE faculty. All full-time students are required to participate in the non-credit seminar course.

5. The modular curriculum

The EE curriculum is a modular one as follows:

Module Description	Credits at least
Core Modules	8
Theoretical and Practical Engineering Pedagogy	6
Laboratory Methodology	2
Theory Modules	4
Psychology and Sociology	3
Ethics (1 credit) or Intercultural competencies (1 credit)	1
Practice Modules	6
Oral Communication Skills, Scientific Writing	3
Working with Projects	1
Media, E-Learning, Computer Aided Technologies	2
Elective Credit Points	2
Electives	2
In Total	20

6. Conclusion

The program has been designed in order to fit the necessities of professionals and institutions interested in the improvement of career and quality performance. It is a flexible program that is developed in according to the needs for the accomplishment of the main goal of the group. It is important to point out that it has also hands on study totally developed in teams, which is not easy but necessary. No doubt that it is the most difficult part of the program, to work in teams, but as much as possible the groups try their best to overcome the obstacles such as communication, stress management and so on [4-5].

The feed back has been very positive from students and enterprises once it has corresponded to their expectations. The program has been a success such that this concept of customized program will be extended for other engineering areas. It is a great achievement for Brazilian academic midst once it can provide for engineers and professionals of technological areas the opportunity to update the knowledge about education as a whole.

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