

Modernization of Undergraduate Education Program (PMG)

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Abstract

The Modernization of Undergraduate Education Program (PMG) in Brazil started in 2019 and it has 8-years long. This modernization program is supported by the Fulbright Commission in Brazil, the U.S. Embassy in Brasilia, and the Ministry of Education, through Brazilian Federal Agency for Support and Evaluation of Graduate Education (CAPES) and National Council of Education (CNE). Eight different engineering undergraduate programs were selected in this first edition aiming the modernization of the engineering education in Brazil. One of the program objectives is making a strong collaboration network between USA and Brazil looking for improvements in undergraduate programs in engineering education and the international tendencies in engineering areas. In order to succeed and to strengthen the internationalization of Brazilian universities, the PMG will provide the resources to the mobility of Brazilian and U.S. faculty and Brazilian Ph.D students. Other objectives aim to promote the entrepreneurship, creativity, and innovation skills among engineering students. We understand these are competencies required by the companies to sustain competitiveness and to innovate in the market in a constant transformation. By this way, engineering schools need to generate new syllabus aligned to competencies of the present and the future and to put the engineering student in a leading role in the learning process, applying active learning methodologies as project-based learning, gamification, flipped learning and so on. These methodologies with the support of modern and digital educational technologies will bring the smart education to our context. Then new facilities as smart classrooms and smart environments are needed to promote the active learning methodologies and to deliver to the Smart Society better engineers with the properly competencies. Although, the competencies and skills assessments are not easy tasks. Faculty members are encouraged and trained to apply innovative assessment methods and tools to evaluate competencies and skills instead only a set of contents. Nevertheless, it is necessary to work in partnership with different levels of higher education, with the Society, and with the productive sector to understand and update the engineering syllabus to fulfill the professional requirements. Much of this may conflict with the federal educational rules, but innovative actions are outcoming from de PMG, so the national regulations around the Brazilian engineering education must be updated if the Brazilian engineering wants to have a leading position. Each of eight of the undergraduate programs has initial results about their Institutional Modernization Projects (IMP) that are outcomes from the first two years of the PMG. Some IMPs are running new curricula in their universities and launching online and hybrid programs whereas other are implementing active learning methodologies in the new smart classrooms. The partnerships between U.S. and Brazilian universities are becoming stronger and many initiatives with the Society and the companies have been increased also. Many

workshops to exchange expertise in engineering education have been done in both local and international networking.

Keywords

Engineering Education, Modernization, Smart Education, Competencies and Undergraduate Program.

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Biography

Ricardo Alexandre Diogo holds a BSc in Mechatronics Engineering (PUCPR), Master in Industrial & Systems Engineering (PUCPR), and now is a PhD candidate in Knowledge Engineering & Management (UFSC). At PUCPR, Ricardo is conducting a very challenge project for Engineering Education in Brazil with the support of The Fulbright Commission in Brazil, the Brazilian Ministry of Education, through CAPES, Brazilian Federal Agency for Support and Evaluation of Graduate Education, the U.S. Embassy in Brasilia, and the National Council of Education. The project is called Modernization of Undergraduate Education Program (PMG). At PUCPR he was the Mechatronics Engineering chair for eight years (2012-2019). Now he is an adjunct professor in the Polytechnic School for the following undergraduate programs: Mechatronics Engineering, Industrial Engineering and Mechanical Engineering. He teaches some courses in Industry 4.0 Engineering and Management graduate program too. Nowadays, he is the past-president and current director of International Society of Automation – Curitiba Section, Board Member of the Specialized Chamber in Electrical Engineering of the Regional Council of Engineering and Agronomy of Parana. His topics of interest in research are: Engineering Education, Digital Transformation (Industry 4.0), Knowledge Engineering and Knowledge Management.

Eduardo Rocha Loures is a Full Professor at the Industrial and Systems Engineering Graduate Program of the Pontifical Catholic University of Parana (PUCPR), and an Associate Professor at the Federal University of Technology – Parana (UTFPR), both in Brazil. He is the Education Chair of the International Society of Automation (ISA, District South America, Section Curitiba, Brazil) since 2010. In 2012, he spent one year as a Visiting Academic at the Research Center for Automatic Control (CRAN), University of Lorraine, France. He holds a BSc Degree in Industrial Electrical Engineering (UTFPR- Brazil), a MSc Degree in Applied Computer – Automation (PUCPR – Parana, Brazil), and a PhD in Industrial Systems (LAAS/CNRS – Toulouse, France). His fields of research and teaching regard business process management, process aware information systems, decision support systems, performance management system, operations management, systems integration, interoperability assessment, and energy management.

Neri dos Santos is a Senior Professor of the Graduate Program in Engineering and Knowledge Management at the Federal University of Santa Catarina (EGC / UFSC) and CEO of the STELA Institute. He holds a BSc degree in Mechanical Engineering from the Federal University of Santa Catarina (1976); specialization in Occupational Safety Engineering from the Federal University of Santa Catarina (1977); a MSc Degree in Ergonomics from the Paris XIII University (1982) – France; a PhD in Ergonomics from Engineering in the “Conservatoire National des Arts et Metiers” (1985) – France; and Postdoctoral in Cognitive Engineering from Polytechnic School of Montreal – Canada. Former President of ABEPRO - Gestão 92/93 and 94/95. Former Dean of the Polytechnic School of the Pontifical Catholic University of Paraná – PUCPR 2015/2018. He serves on the Editorial Board of the following magazines: American Journal of Industrial Engineering, International Journal of Knowledge Engineering and Management, Ergonomic Action and Production and Journal of Science & Technology. His fields of research and teaching regard Engineering & Knowledge Management.