

ISSN: 2358-1271





Universidade Federal de Goiás



5

Goiânia | Volume nº 5 | Edition nº 2 | July-December 2018



UNIVERSIDADE FEDERAL DE GOIÁS (UFG)

*Rector*

Edward Madureira Brasil



ESCOLA DE ENGENHARIA ELÉTRICA,  
MECÂNICA E DE COMPUTAÇÃO (EMC)

*Director*

Reinaldo Gonçalves Nogueira



GRUPO PET – ENGENHARIAS (CONEXÕES  
DE SABERES) (PETEECS/UFG)



*Tutor*

Getúlio Antero de Deus Júnior

GRUPO DE EDUCAÇÃO APLICADA EM  
ENGENHARIA E ENGENHARIA APLICADA  
AO ENSINO (ENAEN/UFG)

*Coordinator*

Getúlio Antero de Deus Júnior

#### EDITOR-IN-CHIEF

Getúlio Antero de Deus Júnior, Universidade Federal de Goiás, Goiânia, Brazil

#### EDITOR

Rodrigo Pinto Lemos, Universidade Federal de Goiás, Goiânia, Brazil

#### INTERNATIONAL EDITORIAL COMMITTEE

- Aly El-Osery, New Mexico Institute of Mining and Technology, Socorro, The United States of America  
Andreia Aoyagui Nascimento, Universidade Federal de Goiás, Goiânia, Brazil  
Christian Weiner, Darmstadt University of Applied Sciences, Darmstadt, Germany  
Christof Sumereder, FH Joanneum University of Applied Sciences, Graz, Austria  
Emmanuel Daniel, Institute Minés-Télécom Atlantique, Brest, France  
Felipe Pamplona Mariano, Universidade Federal de Goiás, Goiânia, Brazil  
Getúlio Antero de Deus Júnior, Universidade Federal de Goiás, Goiânia, Brazil  
Jesús María López Lezama, Universidad de Antioquia, Medellín, Colombia  
Leonardo Guerra de Rezende Guedes, Universidade Federal de Goiás, Goiânia, Brazil  
Lina Paola Garcés Negrete, Universidade Federal de Goiás, Goiânia, Brazil  
Lueny Morell, Lueny Morell & Associates and Director of InnovaHiED, Mayagüez, Puerto Rico  
Luiz Carlos de Campos, Pontifícia Universidade Católica de São Paulo, São Paulo, Brazil

Marcelo Escobar de Oliveira, Instituto Federal de Goiás, Itumbiara, Brazil  
Marcelo Stehling de Castro, Universidade Federal de Goiás, Goiânia, Brazil  
Marco Antônio Assfalk de Oliveira, Universidade Federal de Goiás, Goiânia, Brazil  
Marcos Lemos Afonso, Universidade Federal de Goiás, Goiânia, Brazil  
Nival Nunes de Almeida, Universidade do Estado do Rio de Janeiro, Rio de Janeiro, Brazil  
Natasha Van Hattum-Janssen, Saxion University of Applied Sciences, Enschede, Netherlands  
Rodrigo Pinto Lemos, Universidade Federal de Goiás, Goiânia, Brazil  
Rui Manuel Sá Pereira Lima, Universidade do Minho, Minho, Portugal

#### REVIEWERS

Américo Augusto Nogueira Vieira, Universidade Federal do Paraná, Curitiba  
Amilton Costa Lamas, Pontifícia Universidade Católica de Campinas, Campinas  
Andreia Aoyagui Nascimento, Universidade Federal de Goiás, Goiânia, Brazil  
Anna Cristina Barbosa Dias de Carvalho, Faculdade de Tecnologia, Itaquera  
Archimedes Azevedo Raia Junior, Universidade Federal de São Carlos, São Carlos  
Cassio Dener Noronha Vinhal, Universidade Federal de Goiás, Goiânia  
Denise Rauta Buiar, Universidade Tecnológica Federal do Paraná, Curitiba  
Eliomar Araújo de Lima, Universidade de Brasília, Brasília  
Emiliano Lôbo de Godoi, Universidade Federal de Goiás, Goiânia  
Estéfano Vizconde Veraszto, Universidade Federal de São Carlos, Araras  
Felipe Pamplona Mariano, Universidade Federal de Goiás, Goiânia, Brazil  
Frederico Nicolau Cesarino, Universidade Luterana do Brasil, Manaus  
Getúlio Antero de Deus Júnior, Universidade Federal de Goiás, Goiânia  
Igor Kopcak, Universidade Federal de Goiás, Goiânia  
Irlan von Linsingen, Universidade Federal de Santa Catarina, Florianópolis  
Kléber Mendes Figueiredo, Universidade Federal de Goiás, Goiânia  
Leonardo de Queiroz Moreira, Universidade Federal de Goiás, Goiânia  
Leonardo Guerra de Rezende Guedes, Universidade Federal de Goiás, Goiânia  
Luiz Carlos de Campos, Pontifícia Universidade Católica de São Paulo, São Paulo  
Luiz Carvalho, Universidade Federal do Rio de Janeiro, Rio de Janeiro  
Luiz Eugenio Veneziani Pasin, Universidade Federal de Itajubá, Itajubá  
Mara Marly Gomes Barreto, Universidade Federal do ABC, Santo André  
Marcelo Stehling de Castro, Universidade Federal de Goiás, Goiânia  
Maria Assima Bittar Gonçalves, Universidade Federal de Goiás, Goiânia  
Maria Cristina Kessler, Universidade do Vale do Rio dos Sinos, São Leopoldo  
Marlipe Garcia Fagundes Neto, Universidade Federal de Goiás, Goiânia  
Mauricio Leonardo Aguilar Molina, Universidade Federal de Juiz de Fora, Juiz de Fora  
Miguel Angel Chincaro Bernuy, Universidade Tecnológica Federal do Paraná, Cornélio Procópio  
Reinaldo Gonçalves Nogueira, Universidade Federal de Goiás, Goiânia  
Rodrigo Cutri, Instituto Mauá de Tecnologia, São Caetano do Sul  
Rodrigo Pinto Lemos, Universidade Federal de Goiás, Goiânia  
Sarajane Marques Peres, Universidade de São Paulo, São Paulo  
Sergio Pires Pimentel, Universidade Federal de Goiás, Goiânia  
Sigeo Kitatani Júnior, Universidade Federal de Goiás, Goiânia  
Ubirajara Carnevale de Moraes, Universidade Presbiteriana Mackenzie, São Paulo  
Warley Teixeira Guimarães, Faculdades Integradas São Pedro, Vila Velha

## SISTEMA ELETRÔNICO DE EDITORAÇÃO DE REVISTAS (SEER)

Cássia Oliveira Santos, Biblioteca Central (BC/UFG)  
Cláudia Oliveira de Moura Bueno, Biblioteca Central (BC/UFG)

### SECRETARY

Huesdra Nogueira Campos (EMC/UFG)

## STANDARDS FOR THE PREPARATION OF MANUSCRIPTS EDITOR

Getúlio Antero de Deus Júnior (EMC/UFG)

### PAPERS EDITORS

Getúlio Antero de Deus Júnior (EMC/UFG)  
Huesdra Nogueira Campos (EMC/UFG)  
Bruno Lício Mendes Fontes (EMC/UFG)  
Lucas Ribeiro Marquies (EMC/UFG)  
Alexandre Godinho de Oliveira (EMC/UFG)  
Isabela Magalhães Barcelos Costa (EMC/UFG)  
Isabela Lopes Magalhães (EMC/UFG)  
Isabela Fontes de Araújo (EMC/UFG)  
Lucas Wallace Nascimento Lima (EMC/UFG)

### LANGUAGE REVIEWERS

Authors are responsible for reviewing their papers by an expert in English language.

### GRAPHIC DESIGNER

Getúlio Antero de Deus Júnior (EMC/UFG)

### WEBSITE DESIGNERS

Getúlio Antero de Deus Júnior (EMC/UFG)  
Huesdra Nogueira Campos (EMC/UFG)

### LATEX DESIGNERS

Bruno Lício Mendes Fontes (EMC/UFG)  
Lucas Ribeiro Marquies (EMC/UFG)  
Alexandre Godinho de Oliveira (EMC/UFG)  
Cecília de Sousa Luz Almeida (EMC/UFG)  
Lucas Wallace Nascimento Lima (EMC/UFG)

### SPECIAL SUPPORT

Grupo PET - Engenharias (Conexões de Saberes) (PETEECS/UFG)  
Grupo de Educação Aplicada em Engenharia e Engenharia Aplicada em Educação (EnAEn/UFG)  
Laboratório de Engenharia Multimeios (Engemulti/UFG)  
Pró-Reitoria de Pós-Graduação (PRPG/UFG)

The Grupo de Educação Aplicada em Engenharia e Engenharia Aplicada em Educação (EnAEn/UFG) of the Escola de Engenharia Elétrica, Mecânica e de Computação (EMC) of the Universidade Federal de Goiás (UFG) promotes The International Journal on Alive Engineering Education (IJAAEdu). The journal publishes issues every six months and receives papers in continuous flow, so there will be no deadlines for submitting them. IJAAEdu provides to professionals and academia an electronic space for the dissemination of technical and scientific works related to Engineering Education in Brazil and other countries.

#### CATALOGUING DATA

---

INTERNATIONAL JOURNAL ON ALIVE ENGINEERING EDUCATION. Journal on the Escola de Engenharia Elétrica, Mecânica e de Computação, UFG, v. 5, n. 2, 2018 – Goiânia: IJAEEDU/EMC/UFG, 2018  
v. 5, n. 2, July/Dec./2018.  
Semester.  
ISSN: 2358-1271  
1. Universidade Federal de Goiás – Escola de Engenharia Elétrica, Mecânica e de Computação – Journals.

---

#### INDEXED IN:

IBICT/SEER (<http://seer.ibict.br/>)

#### CONTACT FOR EXCHANGE

SIBI/UFG, Biblioteca Central, Seção de Seleção, Aquisição e Intercâmbio  
Campus Samambaia, Caixa Postal 411, CEP 74001-970, Goiânia-GO

#### CONTACT FOR SIGNATURE

No signatures. The journal can be accessed through the electronic address: <http://www.emc.ufg.br/ijaeedu>

#### CONTACT FOR CORRESPONDENCE

Escola de Engenharia Elétrica, Mecânica e de Computação (EMC/UFG), Avenida Universitária, n.º 1488, quadra 86, bloco A, 3º piso, Setor Leste Universitário, Goiânia-GO, CEP 74605-010.

Phones: (62) 3209-6079, (62) 3209-6070. Fax: (62) 3209-6292.

URL: <http://www.emc.ufg.br/ijaeedu>. E-mail: [revviva.emc@ufg.br](mailto:revviva.emc@ufg.br).

# Editorial

This is the third issue of this journal that is fully published in English language. In first paper, the authors analyzed students answers to pre-tests and post-tests (Open Question and DIRECT) where they could identify common difficulties in Engineering students about DC Electric Circuits. The results show they do not have much practical experience with inner workings of simple circuits. However, other results are presented in this paper.

Simulator softwares are very important to the Engineering Courses. Like this, an evaluation of academic experience in Learning Education (LE) over simulator softwares is presented in second paper this issue. Indeed, the work presents the dimensions of learning styles and the quiz about the use of simulators. Results show that students positively accept the use of simulator in face-to-face classes in undergraduate courses and technological institutions.

The third paper presents the Education as a social and socializing phenomenon whose purpose is to promote people's development. Thus, this work presents the results of applying the Circuit Methodology in Foundation Design Course. The students, divided into groups created two reports based on data for one Standard Penetration Test (SPT) and one Cone Penetration Test (CPT). The results appointed the method as it to be promising, but it still demands some improvements for subsequent applications.

The Sustainability is used as the main theme for the fourth paper that it emerges as a necessary factor for the environment of modern Engineers. In the specific case of this work, the percentage of compulsory environmental disciplines contemplates a greater percentage value of 4.0% in the Electrotechnical Engineering Course whereas a smaller value of 0.8% found in the Control and Automation Engineering Course. In any case, other results of the use of technical standards by the specific case are also presented.

The fifth paper presents important results of the Clown Group - Engineers without Borders (Knowledge Connections) in its almost ten years of existence. Indeed, the members and ex-members of the Clown Group have experienced a major break in introspection, significantly improving their way of communicating with society. Indeed, they presented an improvement in the way they relate to each other in a team, a fundamental aspect of an Engineer's professional life. The Clown Group presents itself as a very important action for Humanistic Training and the professional and personal development of Engineers and Engineering students. In addition, the diffusion of art in the academic and external community promoted by the Clown Group also allows the deconstruction of the stereotype that the areas of Engineering and the Arts cannot coexist.

Finally, the last paper presents an alternative method of internal mobility for the Campus do Vale on Universidade Federal do Rio Grande do Sul (UFRGS). The authors applied an instrument to evaluate the Ciclo Camp Project. A questionnaire was applied to 155 students with active enrollment in UFRGS. From the diagnosis, it was confirmed the need to implement the project in the University as a potential laboratory for the transition to the Circular Economy. The Golden Circle Model was also used to answer important questions about the project.

Getúlio Antero de Deus Júnior, Editor-In-Chief



## Contents

<p>1. Analysis of Engineering Students' Common Difficulties with DC Electric Circuits in An Inquiry-Based Laboratory  <i>Victor Travagin Sanches</i>  <i>Gláucia Grüninger Gomes Costa</i>  <i>Jéssica Fabiana Mariano dos Santos</i>  <i>Tomaz Catunda</i> .....</p> <p>2. Evaluation of Academic Experience in Learning Education over Simulator Softwares  <i>Carlos Alexandre Gouvea da Silva</i>  <i>Edson Leonardo dos Santos</i>  <i>Douglas Antonio Firmino Pelacini</i> .....</p> <p>3. Flipping the Classroom: Applying the Circuit in Foundation Design  <i>Patrick Borges Rodrigues</i>  <i>Phillipe Oliveira Novaes</i>  <i>Stephanny Conceição Farias do Egito Costa</i> .....</p> <p>4. Engineering Graduation: Why Introduce Sustainability  <i>Cynthia Maria de Andrade Lima</i>  <i>Francisco José Costa Araújo</i>  <i>Karin Vanessa Cecílio Panadés</i> .....</p> <p>5. Clown Group - Humanistic Training for Engineering Students  <i>Getúlio Antero de Deus Júnior</i>  <i>Ricardo Henrique Fonseca Alves</i>  <i>Jonas Augusto Kunzler</i>  <i>Antônio Marcelino da Silva Filho</i>  <i>Rodrigo Pinto Lemos</i> .....</p> <p>6. Alternative Method of Internal Mobility for The Campus do Vale on UFRGS  <i>Simone Ramires</i>  <i>Rafaela Cabral Almeida Trizotto</i>  <i>Anthony César Menegasso Menezes</i>  <i>Gabriel Ananias Candido</i> .....</p>	<p style="margin-top: 10px;">13</p> <p style="margin-top: 10px;">23</p> <p style="margin-top: 10px;">41</p> <p style="margin-top: 10px;">49</p> <p style="margin-top: 10px;">61</p> <p style="margin-top: 10px;">81</p>
---	---

