



Republic of the Philippines
CEBU NORMAL UNIVERSITY
 Osmeña Blvd. Cebu City, 6000 Philippines

**RESEARCH INSTITUTE
 FOR COMPUTATIONAL
 MATHEMATICS AND PHYSICS**
 Email: ricmp@cnu.edu.ph
 Website: www.cnu.edu.ph/ricmp/home



ANNUAL REPORT

(January 2018 to December 2018)

This report is based on the following goals of the Research Institute for Computational Mathematics and Physics:

- Perform research of high quality in the field of computational mathematics and physics
- Develop tools and methodologies based on computational mathematics and physics for the use in teaching and learning as well as in industries.

Below are the highlights of the accomplishments of the research institute from January 2018 to March 2018:

✓ The institute has organized/conducted the following research training workshops:

| Event | Brief Description | Resource Speaker(s)/Expert(s) | Output |
|---|---|--|--|
| <p><i>Training Workshop on White Noise Analysis</i></p> <p>Date: March 20-22, 2018 Venue: St. Mark Hotel, Cebu City Participants: <i>All researchers in RICMP</i></p> | <p>The training workshop has equipped the participants (RICMP Researchers) with advanced method on mathematical modelling known as white noise analysis, which is classified as non-Markovian stochastic process. The method can be used to generate model of certain phenomenon by processing/mining big data.</p> | <p>Dr. Christopher C. Bernido and Dr. M. Victoria Carpio-Bernido Research</p> <p>Center for Theoretical Physics Central Visayan Institute Foundation</p> | <p>Three (3) research proposals (with some initial results)</p> <p><i>Bitcoin: A Non-Markovian Stochastic Process</i> <i>by Roberto B. Corcino, Jeneveb T. Malusay, Karl Patrick Casas and Allan Roy Elnar</i></p> <p><i>A Non-Markovian Stochastic Process in Modeling the Fluctuations of the Ozone Thickness</i> <i>by Cristina B. Corcino, Gibson Maglasang and Rodin Paspasan</i></p> |

| | | | |
|--|---|--|--|
| | | | <p><i>Persistent Depreciation of US Dollar Purchasing Power: Stochastic Modelling with Transcendental Memory</i> <i>by Jay M. Ontolan, Ronald Alambra and Joshua Rosell</i></p> |
| <p><i>Lecture Series and Research Training on Lambert W Function and Application (Part II)</i></p> <p>Date: Sept 27-28, 2018 Venue: One Central Hotel, Cebu City</p> <p>Participants: <i>All researchers in RICMP</i></p> | <p>The research training has equipped the participants with additional knowledge about Lambert W Function and its generalization. Moreover, the participants have been exposed to research trends on Lambert W function that leads to identification of some research problems.</p> | <p>Dr. Istvan Mezo</p> <p>Nanjing University of Information Science and Technology, CHINA</p> | <p>Three (3) research proposals (with some initial results):</p> <p><i>Numerical Calculation of the Real r-Lambert Function</i> <i>by Roberto B. Corcino Cristina B. Corcino Jay M. Ontolan Jeneveb T. Malusay Joshua P. Rosell Edward M. Kiunisala Allan Roy B. Elnar Clare Maristela V. Galon</i></p> <p><i>On the Normality of the Omega Constant</i> <i>by Glen M. Pesole Roderick O. Misa Rodin M. Paspasan Floriza N. Laplap Cristopher S. Rosero Joris N. Boluron Ronald P. Alambra Gibson T. Maglasang</i></p> <p><i>Some Applications of Lambert W Function on Free Falling Body</i> <i>by Allan Roy B. Elnar Clare Maristela V. Galon</i></p> |

| | | | |
|--|--|--|----------------------------|
| | | | <i>Gibson T. Maglasang</i> |
|--|--|--|----------------------------|

✓ The researchers of the institute have attended the following seminars, trainings, and conferences:

| Name of Seminars, Trainings, and Conferences | Date and Venue | Involvement | Acquired |
|--|--|--|---|
| <i>2018 Annual Convention of the Mathematical Society of the Philippines</i> | Date: 17–19 May 2018 Venue: Hotel Stotsenberg, Clark Freeport Zone, Pampanga | Chairman of the Convention: <i>Dr. Roberto B. Corcino, RICMP Director</i> Poster Presenter: <i>Joris Buloron</i> <i>Jay M. Ontolan</i> <i>Dr. Roberto B. Corcino</i> Paper Presented: <i>Number of Dissections of the Regular n-gon by Diagonals</i> Participants: <i>Dr. Cristina B. Corcino</i> <i>Jeneveb T. Malusay</i> | Institute popularity Research Dissemination Updates on new research trends in mathematics New research methods in math modelling |
| <i>Workshop on Computational Method</i> | Date: October 5-6, 2018 Venue: Central Visayas Institute Foundation, Jagna, Bohol | Participants: <i>Allan Roy Elnar</i> <i>Gibson Maglasang</i> | New computational methods in math and physics |
| <i>2018 International Conference on Methodological Advances in Research (ICMAR 2018)</i> | Date: July 24-26, 2018 Venue: University of San Jose-Recoletos, Cebu City | Judge for Best Paper Presentation: <i>Dr. Roberto B. Corcino</i> Guest Presenter (Non-entry for | Institute Popularity New research trends and methods in math |

| | | | |
|---|---|---|------------------------------|
| | | Competition): <i>Dr. Roberto B. Corcino</i> | modelling and math education |
| | | Paper Presented: <i>Bitcoin: A Non-Markovian Stochastic Process</i> | |
| | | Participant: <i>Jeneveb T. Malusay – Co-author of the Paper Presented</i> | |
| <i>Research Training Workshop on Applications of Differential Equations</i> | Date: July 16-17, 2018 Venue: Hotel Asia, Cebu City Resource Speaker: <i>Dr. Salasa A. Nawang</i> | Participants: | |

- ✓ The institute has produced the following completed researchers and publications in SCOPUS-Indexed, ISI-indexed and ACI-Indexed journals:

| Title | Status | Date of Completion/ Publication/Presentation |
|--|--|---|
| 1. Continued Fraction Expansions for the Lambert W function <i>by Roberto B. Corcino, Cristina B. Corcino and Istvan Mezo</i> | Completed Published in <i>Equationes Mathematicae</i> https://doi.org/10.1007/s00010-018-0559-2 (ISI-indexed Journal) | January 2018 May 2018 |
| 2. Some polynomials associated with the r-Whitney numbers <i>by Cristina B. Corcino, Roberto B. Corcino, Istvan Mezo and Jose Luis Ramirez</i> | Completed Published in <i>Proceedings-Mathematical Sciences 128 (2018), Article 27</i> (ISI-indexed Journal) | January 2018 June 2018 |
| 3. Equivalent Asymptotic Formulas for r-Stirling <i>by Cristina B. Corcino and</i> | Completed Published in <i>Journal of Inequalities</i> | February 10, 2018 April 2018 |

| | | |
|--|--|-----------------------------------|
| <i>Roberto B. Corcino</i> | <i>and Special Functions</i> , Volume 9 Issue 1(2018), Pages 34-44 (ISI-indexed Journal) | |
| 4. Bitcoin: A Non-Markovian Stochastic Process <i>by Roberto B. Corcino, Karl Patrick Casas and Allan Roy Elnar</i> | Completed Presented during the 2018 International Conference on Methodological Advances in Research (ICMAR 2018) University of San Jose – Recoletos Cebu City Published Journal of Science, Engineering and Technology , Volume 6 (2018), 287-298 (Indexed by ASEAN Citation Index (ACI)) | June 2018 July 24-26, 2018 |
| 5. A Non-Markovian Stochastic Process in Modeling the Fluctuations of the Ozone Thickness <i>by Cristina B. Corcino, Gibson Maglasang and Rodin Paspasan</i> | Completed Published Journal of Science, Engineering and Technology , Volume 6 (2018), 299-307. (Indexed by ASEAN Citation Index (ACI)) | September 18, 2018 |
| A Logistic Function for Hiring University Professors <i>by Roberto B. Corcino and Dominador Dawa</i> | Completed Published Journal of Educational and Human Resource Development , Volume 6 (2018), pp. 190-198. (Indexed by ASEAN Citation Index (ACI)) | |
| 6. Persistent Depreciation of | Completed | September 2018 |

| | | |
|--|--|--|
| <p><i>US Dollar Purchasing Power: Stochastic Modelling with Transcendental Memory</i> <i>by Jay M. Ontolan, Ronald Alambra and Joshua Rosell</i></p> | | |
|--|--|--|

- ✓ The institute has considered three research problems for proposal construction, which are the outputs of the recently conducted lecture series and training workshop on Lambert W function and Application (Part II).

| Title | Status | Date of Submission/ Completion/Publication |
|---|------------------------------|---|
| <p><i>Numerical Calculation of the Real r-Lambert Function</i> <i>by Roberto B. Corcino Cristina B. Corcino Jay M. Ontolan Jeneveb T. Malusay Joshua P. Rosell Edward M. Kiunisala Allan Roy B. Elnar Clare Maristela V. Galon</i></p> | <p>Proposal Construction</p> | <p>October 4, 2018</p> |
| <p><i>On the Normality of the Omega Constant</i> <i>by Glen M. Pesole Roderick O. Misa Rodin M. Paspasan Floriza N. Laplap Cristopher S. Rosero Joris N. Boluron Ronald P. Alambra Gibson T. Maglasang</i></p> | <p>Proposal Construction</p> | <p>October 4, 2018</p> |
| <p><i>Some Applications of Lambert W Function on Free Falling Body</i> <i>by Allan Roy B. Elnar Clare Maristela V. Galon Gibson T. Maglasang</i></p> | <p>Proposal Construction</p> | <p>October 4, 2018</p> |

- ✓ The institute has two (2) externally funded research projects and two research projects funded by CNU-CRD.

| Title of the Research Project | Status | Funding Agency/Project Cost |
|---|---------------|--|
| <i>HANKEL TRANSFORM OF q-ANALOGUE OF r- DOWLING NUMBERS</i> <i>by Roberto B. Corcino, Jay M. Ontolan and Istvan Mezo</i> | Approved | CHED-GIA Project Cost: PhP 2,457,961.10 |
| <i>THE GENERALIZED LAMBERT W FUNCTION, ITS PROPERTIES AND APPLICATIONS</i> <i>by Cristina B. Corcino, Roberto B. Corcino, Wilson Castañeda and Istvan Mezo</i> | Approved | CHED-GIA Project Cost: PhP 3,142,038.90 |
| <i>EXPLICIT FORMULA FOR TRANSLATED R-DOWLING NUMBERS IN TERMS OF TRANSLATED R-WHITNEY- LAH NUMBERS AND TRANSLATED R-WHITNEY NUMBERS OF THE SECOND KIND</i> <i>by Roberto B. Corcino, Jeneveb T. Malusay</i> | Approved | CNU-CRD Project Cost: PhP 156,200.00 |
| <i>ASYMPTOTIC FORMULAS FOR GENOCCHI AND GENERALIZED GENOCCHI POLYNOMIALS</i> | Approved | CNU-CRD Project Cost: PhP 156,200.00 |

- ✓ The institute has established the following research collaboration and linkages:

| Name of Collaborator | Affiliation | Extend of Collaboration |
|-----------------------------|--|--|
| <i>Dr. Istvan Mezo</i> | Nanjing University of Information Science and Technology Nanjing, CHINA | Co-Author of Research Project Funded by CHED-GIA Co-Author of Research Publications |

| | | |
|--------------------------------|---|--|
| <i>Dr. Takao Komatsu</i> | Wuhan University Wuhan, CHINA | Co-Author of Research Publications |
| <i>Prof. Hassan Jolany</i> | University of California – San Diego, USA | Co-Author of Research Publications |
| <i>Dr. Christopher Bernido</i> | Central Visayas Institute Foundation, Jagna, Bohol | Consultant of the acquired method of math modelling (White Noise Analysis) |

Prepared by:

JAY M. ONTOLAN

Chairman, Division of Computational Mathematics

ROBERTO B. CORCINO, Ph.D.

Director, Research Insitute for Computational Mathematics and Physics