

Courses to be offered in English. Cienfuegos University.

Faculty of Engineering.

Computer Engineering career:

1. Developing Artificial Intelligence for Business Management

Instructor: Eduardo R. Concepción, PhD

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Course objectives and learning goals

- Gain knowledge of artificial intelligence principles that enable to design intelligent systems
- Understand the theory behind graph search algorithms, classification, optimization, reinforcement learning, and other topics in artificial intelligence and machine learning and incorporate them in Python programs

Course contents:

- Graph search algorithms
- Knowledge representation
- Logical inference
- Machine learning
- Neural networks
- Natural language processing

Evaluation criteria

Assigned projects – 40%

Final Project – 60%

2. Big Data Analytics for Business

Professor: Raidell Avello Martínez, PhD

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Phone: 53311809

OBJECTIVE

Understand and utilize the basic practices of data science in R for any domain.

CONTENTS

- Introduction to data science
- Introduction to R and RStudio
- Types of Variable.
 - Categorical and Continuous Attributes
- Importing Data

- Data Preparation
 - Data Cleaning
 - Managing Missing Values
- Data visualization
 - Scatter plots
 - Line graphs
 - Bar charts
 - Histograms
 - Box plots
- Applying basic statistics with R

EVALUATION SYSTEM

The evaluation will be developed through group work and case studies, using participatory methods that activate the learning process. In addition, the course concludes with a project where the acquired knowledge is applied.

BIBLIOGRPHY

- Field, A., Miles, J. Field, Z. (2012). Discovering statistics Using R. SAGE Publications Ltd
- Golemund, G. and Wickham, H. (2017). R for Data Science. O'Reilly Media, Sebastopol, CA, first edition.
- Ismay, C., Kim, A.Y. Statistical Inference via Data Science. A ModernDive into R and the Tidyverse. CRC Press. <https://moderndive.com/>
- James, G., Witten, D., Hastie, T., Tibshirani, R.: An Introduction to Statistical Learning: With Applications in R. Springer, New York (2013)
- R Core Team: R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna (2020). <https://www.R-project.org>
- Wickham, H., Golemund, G. (2017). R for Data Science: Import, Tidy, Transform, Visualize, and Model Data. O'Reilly Media.

3. Automatization Techniques.

Professor: Raidell Avello Martínez, PhD

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OBJECTIVE

Apply learning analytics technics for Moodle in online education with internal and external tools.

CONTENTS

- Introduction to learning analytics

- Learning analytics tools
- Available Moodle plugins
- UBUMonitor
 - Analysing students' accesses
 - Analysing forum participation
 - Analysing component uses
 - Analysing students in risk

EVALUATION SYSTEM

The evaluation will be developed through group work and case studies, using participatory methods that activate the learning process. In addition, the course concludes with a project where the acquired knowledge is applied.

BIBLIOGRPHY

- C. Romero and S. Ventura, (2010). Educational Data Mining: A Review of the State-of-the-Art. IEEE Transactions on Systems, Man, and Cybernetics–Part C: Applications and Reviews. 40:601–618.
- G. Siemens and R. S. J. d. Baker. (2012). Learning Analytics and Educational Data Mining: Towards Communication and Collaboration. Proceedings of the 2nd International Conference on Learning Analytics and Knowledge. 1–3.
- J. Cole and H. Foster. (2005). Using moodle, 2nd ed, O'Really Community Press, Sebastopol, CA.
- Moodle official documentation. <https://docs.moodle.org/>
- Sáiz-Manzanas, M.C.; Rodríguez-Díez, J.J.; Díez-Pastor, J.F.; Rodríguez-Arribas, S.; Marticorena-Sánchez, R.; Ji, Y.P. Monitoring of Student Learning in LearningManagement Systems: An Application of Educational Data Mining Techniques. Appl. Sci. 2021, 11, 2677. <https://doi.org/10.3390/app11062677>
- UBUMonitor official documentation. <https://ubumonitordocs.readthedocs.io/es/latest/>
- W. H. Rice. (2015). Moodle E-learning course development. A complete guide to succesful learning using moodle, 3rd ed, Packt Publishing, Birmingham, UK.

4. Application Development and Implementation.

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OBJECTIVE

Evaluate the validity and reliability of the measurement instruments with R.

CONTENTS

- Definition and operationalization of variables. Concepts and definitions on measurement scales.
- Requirements for the elaboration of the items of the questionnaire.
- Introduction to R.
- Database development.
- General aspects of measurement reliability:
 - Stability (Test Retest, equivalent versions, two-half intraclass correlation coefficients and Kappa coefficient).
 - Interobserver reliability (intraclass correlation coefficient and Kappa coefficient).
 - Internal consistency (Cronbach's α coefficient and Kuder-Richardson's formula 20).
 - Applications in R.
- General aspects of measurement validity.
 - Content validity: expert judgment (binomial test, Aiken v coefficient, factor analysis).
 - Criterion validity: concurrent and predictive (intraclass correlation coefficient, sensitivity and specificity).
 - Construct validity (Factor analysis, intraclass correlation coefficient).
 - Applications in R.

EVALUATION SYSTEM

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BIBLIOGRAPHY

- Cooper, C. (2019). Psychological testing: Theory and practice. New York: Routledge.
- Hill, C. A., Biemer, P. P., Buskirk, T. D., et al. (2020). Big data meets survey science: A collection of innovative methods. Hoboken, NJ: John Wiley & Sons, Inc.
- Irwing, P., Booth, T., & Hughes, D. J. (2018). The Wiley-Blackwell handbook of psychometric testing: A multidisciplinary reference on survey, scale and test development. Hoboken, NJ Wiley Blackwell.
- American Educational Research Association. (2014). Standards for educational and psychological testing. Washington: American Educational Research Association.
- Laaksonen, Seppo. (2018). Survey Methodology and Missing Data: Tools and Techniques for Practitioners. Cham : Springer International Publishing.

5. Fundamentals of Web programming with Django y JavaScript.

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Course objectives and learning goals

- Design and implement web applications with Python
- Apply usability and accessibility standards
- Implement security policies in web applications

Course contents:

- Introduction to Web Programming
- Server-side technologies
- Client-side technologies
- Security in web applications

Evaluation criteria

Assigned projects – 40%

Final Project – 60%