

Index

- SCC0200 - Professional Information and Mentoring on Computer Science
- SCC0221 - Introduction to Computer Science I
- SCC0222 - Introduction to Computer Science: Laboratory Practice I
- SMA0300 - Analytic Geometry
- SMA0353 - Calculus I
- SSC0104 - Computing History, Evolution and Applications
- SSC0109 - Introduction to Digital Logic: Laboratory Practice
- SSC0117 - Introduction to Digital Logic
- SSC0180 - Electronics for Computer Sciences
- SCC0201 - Introduction to Computer Science II
- SCC0202 - Algorithms and Data Structures I
- SMA0180 - Discrete Mathematics I
- SMA0354 - Calculus II
- SSC0108 - Digital Systems: Laboratory Practice
- SSC0118 - Digital Systems
- SCC0215 - File Organization
- SCC0216 - Computational Modelling in Graphs
- SMA0355 - Calculus III
- SSC0103 - Object-Oriented Programming
- SSC0902 - Organization and Architecture of Computers
- SSC0960 - Functional Programming
- SCC0218 - Advanced Algorithms and Applications
- SME0123 - Statistics
- SME0142 - Linear Algebra and Applications
- SSC0124 - Object-Oriented Analysis and Design
- SSC0140 - Operating Systems I
- SCC0219 - Introduction to Web Development
- SCC0240 - Databases
- SME0104 - Numerical Analysis
- SME0121 - Stochastic Processes
- SSC0130 - Software Engineering
- SSC0142 - Computer Networks
- SCC0205 - Theory of Computation and Formal Languages
- SCC0207 - Computers and Society I
- SCC0230 - Artificial Intelligence
- SME0110 - Mathematical Programming
- SSC0903 - High Performance Computing
- SCC0217 - Programming Language and Compilers
- SCC0250 - Computer Graphics
- SSC0120 - Information Systems
- SSC0900 - Security Engineering
- SSC0904 - Distributed Computing Systems
- SCC0291 - Supervised Professional Practice I
- SCC0292 - Supervised Professional Practice II
- SCC0220 - Laboratory of Introduction to Computer Science II
- SCC0303 - Introduction to Data Compression
- SSC0119 - Practice in Computer Organization
- SCC0213 - Scientific Methodology for Computer Science Research
- SCC0227 - Seminars in Computing I
- SCC0295 - Academic Extension Activities I

- SCC0210 - Advanced Algorithms Laboratory I
- SCC0228 - Seminars in Computing II
- SCC0296 - Academic Extension Activities II
- SSC0953 - Open Source Systems
- SCC0211 - Advanced Algorithms Laboratory II
- SCC0229 - Seminars in Computing III
- SCC0247 - NoSQL databases and distributed processing frameworks
- SSC0770 - Introduction to Digital Games Development
- SSC0954 - Infrastructure for High Performance Computing and Distributed Systems
- SCC0209 - Entrepreneurship in Informatics
- SCC0241 - Databases Laboratory
- SCC0243 - Architecture of Database Management Systems
- SCC0245 - Data Analytical Processing
- SCC0251 - Image Processing
- SCC0260 - Human-Computer Interaction and User Experience
- SCC0261 - Multimedia
- SCC0270 - Neural Networks and Deep Learning
- SCC0276 - Machine Learning
- SCC0282 - Information Retrieval
- SCC0284 - Recommender Systems
- SCC0370 - Introduction to Bio-inspired Computing
- SCC0633 - Natural Language Processing
- SCC0910 - Advanced Topics in Computer Science I
- SME0130 - Complex Networks
- SME0806 - Computational Statistics
- SSC0141 - Practice in Operating Systems
- SSC0147 - Special Topics in Computer Systems I
- SSC0154 - Advanced Lectures in Distributed Systems and Concurrent Programming I
- SSC0158 - Cloud Computing and Service-Oriented Architecture
- SSC0160 - Modeling and Simulation of Computational Systems
- SSC0712 - Mobile Robots Programming
- SSC0714 - Autonomous Mobile Robots
- SSC0723 - Collaborative Systems: Fundamentals and Applications
- SSC0725 - Software Architecture
- SSC0740 - Embedded Systems
- SSC0950 - System Software Design and Development
- SCC0951 - Development of optimized code
- SCC0959 - Software Testing and Inspection
- SCC0225 - Mobile Application Development Lab
- SCC0231 - Introduction to Intelligent Systems
- SCC0233 - Machine Learning and Data Mining Applications
- SCC0244 - Data Mining in Large Databases
- SCC0252 - Computational Visualization
- SCC0254 - Introduction to Computational Geometry: algorithms and applications
- SCC0271 - Introduction to Bioinformatics
- SCC0273 - Intelligent Mobile Robots
- SCC0275 - Introduction to Data Science
- SCC0277 - Data Science Competitions
- SCC0280 - Accessibility in Computer Systems
- SCC0283 - Introduction to Semantic Web
- SCC0287 - Unstructured Data Mining
- SCC0911 - Advanced Topics in Computer Science II
- SME0808 - Time Series Analysis and Dynamical Learning
- SME0822 - Multivariate Analysis and Unsupervised Learning

- SME0823 - Regression Models and Supervised Learning II
- SSC0123 - Special Topics in Software Engineering
- SSC0128 - Project Management
- SSC0152 - Network Management and Administration
- SSC0159 - Advanced topics on High Performance Computing
- SSC0643 - Computer Systems Performance Evaluation
- SSC0713 - Evolutionary systems applyied to robotics
- SSC0715 - Intelligent Sensors
- SSC0720 - Software Enginnering for Embedded Systems
- SSC0724 - Advanced Learning Technologies
- SSC0726 - Software Reuse
- SSC0741 - Design and Implementation of Embedded Systems I
- SSC0744 - Distributed Computation
- SSC0745 - Real-time Computer Systems
- SSC0748 - Mobile Networks
- SSC0901 - Laboratory on Security Engineering
- SSC0952 - Internet of Things
- SSC0958 - Criptocurrencies and Blockchain
- SCC0289 - Supervised Exchange Project I
- SCC0293 - Undergraduate Project I
- SCC0300 - Entrepreneurs Project I
- SME0878 - Statistical Data Mining
- SCC0290 - Supervised Exchange Project II
- SCC0294 - Undergraduate Project II
- SCC0302 - Entrepreneurs Project II
- 5500002 - Seminars on organizational management
- SMA0392 - Calculus I (semi-presencial)
- SMA0394 - Analytic Geometry (semi-presencial)
- SMA0390 - Calculus II (semi-presencial)
- SMA0393 - Calculus III (semipresencial)
- SMA0391 - Calculus IV (semi-presencial)

Course: SCC0200 - Professional Information and Mentoring on Computer Science

Class Credits: 2

Work Credits: 0

Total workload: 30 h

Type: Semester

Activation: 01/01/2018 **Deactivation:**

Goals

To familiarize the student with the field of Computer Science, providing a broad picture on the course structure as a whole and the several areas of Computer Science. To introduce the student to the academic routine, presenting and discussing the related issues, aiming at supervising the students' performance, advising them during the progress of the course, and providing guidance on complementary activities and the career in the computing area, increasing student achievement and reducing dropout and retention in the course.

Menu

The course has an instructive character, presenting a general overview of the Computer Science area, introducing the students to its several fields (as databases, software engineering, operational systems, artificial intelligence, computer graphics, computer networks and web, among others), their development, applications, and technological, social and economic consequences, as well as their impact in the world. Realization of academic mentoring activities, with discussions on the new academic routine, study scheduling, academic performance, extracurricular activities and institutional opportunities, career guidance, and ethical and citizen behavior in the university environment, among other issues of interest.

Syllabus

The course has an instructive character, presenting a general overview of the Computer Science area, introducing the students to its several fields (as databases, software engineering, operational systems, artificial intelligence, computer graphics, computer networks and web, among others), their development, applications, and technological, social and economic consequences, as well as their impact in the world. Realization of academic mentoring activities, with discussions on the new academic routine, study scheduling, academic performance, extracurricular activities and institutional opportunities, career guidance, and ethical and citizen behavior in the university environment, among other issues of interest.

Evaluation instruments and criteria

Evaluation method

Presentation of seminars and lectures by teachers and guest professionals. Meetings with teachers for academic tutoring activities.

Evaluation criterion

Weighted average of work and report notes.

Recovery

-Approval Criterium: $NP + (MREC/2.5)$, if $MREC \geq 7.5$; or $\max\{NP, MREC\}$, if $MREC < 7.5$.
(NP = 1st evaluation, mrec = proof)

Basic bibliography

BROOKSHEAR, J.G. (2013). Computer Science - a comprehensive view. Bookman.11th edition.

Articles published in magazines in the area.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0221 - Introduction to Computer Science I

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Present the basic concepts of computational thinking applied to problem solving. Develop skills to write small programs using a programming language. Basic concepts about computers and computing. Problem solving and algorithm design. Programming structures. Simple data types. Modularization. Composite data types. Files. Debugging. Structured programming language.

Responsible teacher (s) (s)

6116132 - Moacir Antonelli Ponti

Menu

Basic concepts about computers and computing: hardware, software, operating system, compilers, internal representation of data and programming language. Problem solving and algorithm design: analysis and problem solving, representation and documentation.

Syllabus

Programming structures: decision and repetition. Simple data types. Modularization: procedures, functions and argument passing. Composite data types: arrays, matrices, strings, register/structures, sets and dynamic structures (pointers). Files. Debugging. Structured programming language

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work performed during the exhibition classes and in the laboratory.

Evaluation criterion

Evidence, works, exercises. The final grade will be calculated by the weighted average of the tests of tests, works and exercises obtained by the student during the course.

Recovery

Nota Final: = $(NP-2) / 5 * Mrec + 7 - NP \leq Mrec \leq 5$; ou

Max (np, mrec) if mrec < 5

Being np = grade of the 1st evaluation and
MREC = Recovery Average

Basic bibliography

Text Book:

ASSEMBER, A. F. G.; CAMPOS, E. A. V. Fundamentals of Computer Programming Algorithms, Pascal and C/C ++, Prentice Hall, 2003. (2002, 2005, 2008).

Complementary Bibliography:

SCHILD, HERBERT, C Completo e Total, Pearson, 2006. (2008)
KELLEY, A. A book on C, Addison-Wesley, 2005 (1998)
FORBELLONE, A. L. V.; EBERSPACHER, H. F. Programming logic, 2nd. Edition, Makron Books, 2000. (2006)
Manzano, J.A. I study algorithms. Ed. Érica, 2008
KERNIGHAM, B.; RITCHIE, D. The C Programming Language, Prentice-Hall, 1988.
KERNIGHAM, b. Programming practice, 2000.
Victorine Viviane Mizrahi, C Language Training Module 1 and Module 2, Makron Books, 1990
Victorine Viviane Mizrahi, C Language Training, 2nd ed., Makron Books, 2008.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Materials Disclosure (via YouTube, Lectures, etc.) About what a computer is programmed, how it works, what are programming languages, programming logic, or how to program in a specific language. Extension work with computing personalities such as the least "famous" Charles Babbage and Dennis Ritchie, or even in the line of disclosure valuing the role of women in computing such as Ada Lovelace, Grace Hopper and Margaret Hamilton, can also be performed.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0222 - Introduction to Computer Science: Laboratory Practice I

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Type: Semester

Activation: 01/01/2015 **Deactivation:**

Goals

Use a structured programming language to create programs based on the programming techniques presented in the course Introduction to Computer Science I.

Menu

Problem solving and algorithm design. Programming structures. Simple data types. Modularization. Composite data types. Files. Debugging. Structured programming language.

Syllabus

Problem solving and program development: analysis and problem solving, representation and documentation. Programming structures: decision and repetition. Simple data types. Modularization: procedures, functions and argument passing. Composite data types: arrays, matrices, strings, registers/structures, sets and dynamic structures (pointers). Files. Debugging. Structured programming language.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work performed during the exhibition classes and in the laboratory.

Evaluation criterion

Evidence, works, exercises. The final grade will be calculated by the weighted average of the tests of tests, works and exercises obtained by the student during the course.

Recovery

Nota Final: = $(NP-2) / 5 * Mrec + 7 - NP \leq Mrec \leq 5$; ou

Max (np, mrec) if mrec < 5

Being np = grade of the 1st evaluation and

MREC = Recovery Average

Basic bibliography

Text Book:

ASSEMBER, A. F. G.; CAMPOS, E. A. V. Fundamentals of Computer Programming Algorithms, Pascal and C/C ++, Prentice Hall, 2003. (2002, 2005, 2008).

Complementary Bibliography:

SCHILD'T, HERBERT, C Completo e Total, Pearson, 2006. (2008).

KELLEY, A. A book on C, Addison-Wesley, 2005 (1998).

FORBELLONE, A. L. V.; EBERSPACHER, H. F. Programming logic, 2nd. Edition, Makron Books, 2000. (2006)

Manzano, J.A. I study algorithms. Ed. Érica, 2008

KERNIGHAM,B.; RITCHIE,D. The C Programming Language, Prentice-Hall, 1988.

KERNIGHAM, b. Programming practice, 2000.

Victorine Viviane Mizrahi, C Language Training Module 1 and Module 2, Makron Books, 1990.

VICTORINE VIVIANE MIZRAHI, Treinamento em Linguagem C, 2^a Ed., Makron Books, 2008.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SMA0300 - Analytic Geometry

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2009 **Deactivation:**

Goals

The discipline aims at familiarizing students with analytic geometry in 2 and 3 dimensions, emphasizing its geometric aspects and their translations into Cartesian coordinates.

Responsible teacher (s) (s)

5765587 - Paulo Leandro Dattori da Silva

Menu

Coordinate systems. Lines and planes. Conics. Quadrics.

Syllabus

Cartesian coordinates. Vectors. Linear dependence. Basis. Dot product. Vector product. Translation and rotation. Lines and planes. Distance and angle. Conics. Reduced equation of a quadric surface. Polar, cylindrical and spherical coordinates.

Evaluation instruments and criteria

Evaluation method

Exhibition in classes and fixation through exercise, with the guidance of the teacher.

Evaluation criterion

Evaluation through written tests, works and seminars.

Recovery

Number of tests: At least one (01) and at most two (02) tests. Approval Criterium: The final grade (MF) of the student who has taken recovery tests will depend on the average of the semester (MS) and the average recovery tests (MR), as follows: $mf = 5$ if $5 \leq mr \leq 10 - ms$; $Mf = (ms + mr) / 2$ if $mr > 10 - ms$; $mf = ms$ if $mr < 5$.

Basic bibliography

TEXT BOOKS:

.Winterle, P., Steinbruch, A., Analytical Geometry, a vector treatment, Rio de Janeiro:

MacGraw-Hill, 1987.
.Caroli, A., Callioli, C.A., Feitosa, M.O., Matrices, Vectors and Analytical Geometry, 9 ed, Sao Paulo: Nobel, 1978.
.Boulos, P., Camargo, I., Analytical Geometry - A Vector Treatment, Rio de Janeiro: McGraw -Hill, 1987.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SMA0353 - Calculus I

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2015 **Deactivation:**

Goals

Students should be able to understand the meaning of limit, continuity, derivative, and primitive of a one real variable function.

Menu

Real functions. Limits. Continuity. Derivatives. Primitives.

Syllabus

The real numbers. Functions of one real variable. Limit. Continuity. Differentiability. The chain rule. Related rates. Maxima and minima of functions. Graph of functions. Taylor's formula. Differential. Primitives.

Evaluation instruments and criteria

Evaluation method

Exhibition in classes and fixation through exercise, with the guidance of the teacher.

Evaluation criterion

Evaluation through written tests, works and seminars.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests.

Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

MF = 5 if $5 < \text{you} = \text{Mr} < \text{you} = (10 - \text{ms})$;

MF = $(\text{MS} + \text{MR}) / 2$ se $\text{MR} > 10 - \text{MS}$

MF = MS se $\text{MR} < 5$.

Basic bibliography

TEXT BOOKS:

- Guidorizzi, H.L. A calculation course, 5th ed., V. 1, Rio de Janeiro: Technical and Scientific Books Editora, (2001).
- Stewart, J. Calculation, V. 1 and 2, 4th ed., Pioneer, São Paulo, (2001).
- Thomas, G.B. Calculation, V. 1, 10th ed., Addison-Wesley, São Paulo, (2002).

- Táboas, P.Z. Differential and integral calculation in the line, class grades, ICMC-USP.

Complementary:

- Swokowski, E.W. Calculation with Analytical Geometry, V. 1 and 2, 2a. Edition, Makron-Books of Brazil Editora Ltda, Rio de Janeiro, (1995).
- SIMMONS, G.F. Calculation with Analytical Geometry, V. 1 and 2, MC Graw-Hill of Brazil, Rio de Janeiro, (1987).
- Count, A. Fast Calculus, ICMC-USP, 2001.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0104 - Computing History, Evolution and Applications

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Extension workload: 30 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Introduce the student to an overview of computer science evolution, identifying landmarks, relevant characters and their contribution. Motivate the new students by the exposition of important developments and applications of computer sciences in different areas, linking them to mathematical concepts to be learned later in the course.

Responsible teacher (s) (s)

7331194 - Claudio Fabiano Motta Toledo

Menu

Historical overview of computer sciences and informatics. The evolution of calculating machines and their role in history. Characters, organizations and companies that contributed significantly to the development of computer sciences and new technologies. Hardware systems: historical landmarks and evolution. Development of software systems in different areas of informatics: historical landmarks and evolution. Application examples

Syllabus

Historical overview of computer sciences and informatics. The evolution of calculating machines and their role in history. Characters, organizations and companies that contributed significantly to the development of computer sciences and new technologies. Hardware systems: historical landmarks and evolution. Development of software systems in different areas of informatics: historical landmarks and evolution. Application examples

Evaluation instruments and criteria

Evaluation method

Expository classes, visits to the ICMC Computer Museum, Internet research with visits to Virtual Computer and Computing Museums. Explore and carry out work from the ICMC Computer Museum collection. Exposure to classic systems and environments developed in different computing disciplines, such as information systems, artificial intelligence, computer graphics, and others.

Evaluation criterion

Notes will be assigned to the work prepared by the students, seminars and tests, at the discretion of the responsible teacher. Works may include content generation for the ICMC Computing Museum as an assembly of exhibitions, videos, podcasts and others, aiming to support the museum in the dissemination of the collection for the community. The grade will be calculated by the weighted average of the grades obtained by the student during the semester, in the different proposed activities.

Recovery

(Np -2) / 5 * mrec + 7 - np, if mrec> 5 max {np, mrec}, if mrec <5

Basic bibliography

Livro Texto:

- FONSECA FILHO, C. História da Computação, Teoria e Tecnologia. Editora LTR, 2000.
- WAZLAWICK, Raul Sidnei. História da Computação, Elsevier, 2016, 584p. 1^a edição.

Bibliografia Complementar:

- CERUZZI, P.E. A History of Modern Computing. MIT Press, 2000.
- GREENIA, M.W. History of Computing: An Encyclopedia of the People and Machines that Made Computer History. Lexikon Services, 2001.
- WILLIAMS, M.R. A History of Computing Technology. IEEE Computer Society Press, 1997.
- IFRAH, G. The Universal History of Computing: From the Abacus to the Quantum Computer. John Wiley & Sons, 2000.
- ASPRAY, W. John Von Neumann and the Origins of Modern Computing. MIT Press, 1990.
- HODGES, A. Alan Turing: The Enigma. Walker & Co, 2000.
- IEEE Annals of the History of Computing (publicações relativas ao período de 1992 até os dias de hoje estão disponíveis, por assinatura, no IEEE Xplore). Ver também <http://www.computer.org/annals/archives.htm> SITES:
- Museu de Computação e Informática (MCI, Sorocaba): <http://www.mci.org.br/>
- Museu Virtual de Informática (Departamento de Sistemas de Informação da Universidade do Minho, Portugal): <http://piano.dci.uminho.pt/>
- The Virtual Museum of Computing (UK): <http://vmoc.museophile.com/>
- The Alan Turing Home Page: <http://www.turing.org.uk/turing/>
- Timeline of Computing History: <http://www.computer.org/computer/timeline/>

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Availability of didactic material

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in proposed activities. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic production: quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0109 - Introduction to Digital Logic: Laboratory Practice

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 01/01/2017 **Deactivation:**

Goals

Introduce to the student the practice of basic concepts in electronics and digital logic, design techniques of digital subsystems with an emphasis on combinational circuits.

Menu

Practice related to combinational circuits, logic functions, numerical representation and arithmetic circuits.

Syllabus

Practice in combinational circuits, logic functions, logic circuits, algebraic simplification, disjunctive and conjunctive normal forms, Karnaugh maps, decoders, numerical representation, adding circuits, subtractors and multipliers, multiplex and demultiplex.

Evaluation instruments and criteria

Evaluation method

Exhibition and exercise resolution classes.

Evaluation criterion

Weighted average of the test notes and group work or individual.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC >= 7.5; or max {np, mrec}, if mrec <= 5.0; or 5.0, if 5.0 <= mrec < 7.5. (NP = 1st evaluation, MREC = recovery test).

Basic bibliography

Texto:

- BROWN, S.; VRANESIC, Z. Fundamentals of Digital Logic with VHDL Design, McGraw Hill, 2005
- IDOETA, I.V.; CAPUANO, F.G. Elementos de Eletrônica Digital, Livros Érica, 2007

Bibliografia Complementar:

- HALL, D.V. Digital Circuits and Systems, McGraw-Hill Publishing Company, 1989.
- BROWN, STEPHEN D.; Field-programmable gate arrays; Kluwer Academic Publishers, 1992.

- WAKERLY, J. F. Digital Design: Principles & Practices, 3 Edition, 950 páginas, Prentice Hall, 2000.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0117 - Introduction to Digital Logic

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 01/01/2017 **Deactivation:**

Goals

Introduction of basic concepts of electronics and digital logic, techniques of design of digital subsystems emphasizing combinatorial circuits.

Menu

Combinatorial circuits, logic functions, numeric representations and arithmetic circuits.

Syllabus

Combinatorial circuits, logic functions, logic circuits, algebraic simplification, conjunctive and disjunctive normal forms, Karnaugh maps, decoders, numeric representations, circuits of adders, subtractors and multipliers, multiplexer and demultiplexer.

Evaluation instruments and criteria

Evaluation method

Exhibition and exercise resolution classes.

Evaluation criterion

Weighted average of the test notes and group work or individual.

Recovery

Approval Criteria: $NP + (MREC/2.5)$, if $MREC >= 7.5$; or $\max\{np, mrec\}$, if $mrec \leq 5.0$;
or $5.0 \leq mrec < 7.5$. ($NP = 1st$ evaluation, $MREC = recovery$ test).

Basic bibliography

Text:

- BROWN, S.; VRANESIC, Z. Fundamentals of Digital Logic with VHDL Design, McGraw Hill, 2005
- IDETA, I.V.; CAPUANO, F.G. Elements of Digital Electronics, Books Érica, 2007

Complementary Bibliography:

- HALL, D.V. Digital Circuits and Systems, McGraw-Hill Publishing Company, 1989.
- BROWN, STEPHEN D.; Field-programmable gate arrays; Kluwer Academic Publishers, 1992.

- WAKERLY, J. F. Digital Design: Principles & Practices, 3 Edition, 950 páginas, Prentice Hall, 2000.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0180 - Electronics for Computer Sciences

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Introduction of basic concepts of electronic circuits, with emphasis on the utilization of basic electronic components, such as resistors, diodes and transistors, on the designs of circuits and digital logic gates. Study signal propagation in electric circuits. Familiarize the student with instrument utilization, such as multimeters and power sources.

Responsible teacher (s) (s)

1842655 - Simone do Rocio Senger de Souza

Menu

Basic concepts of electronic circuits; Basic component characterization: resistors, capacitors, diodes and transistors; Designs of electronic circuits with basic components; Designs of digital logic gates with transistors; Application of power sources to electronic circuits; Measurement of electric signal propagation; Design and implementation of direct current power sources; Study of transitory effects on the electric signal propagation in digital logic circuits.

Syllabus

The course is fundamentally experimental and should explore the circuit implementation and measurement of voltage and current values, as well as make use of electric circuit simulators to visualize wave forms. The students will study the effects of the application of current and voltage sources on electric circuits with resistors and the implementation of filtered direct current power sources. The application of transistors as binary switches will be studied, as well as the design of logic functions, such as NOT, AND OR and XOR gates. Transitory effects on the propagation of electrical signals in digital logic circuits will also be considered, such as rising and falling time, fan-out effects, and their waveforms, as well as logic gate and interconnection line signal delays due to associated capacitive values. NMOS and CMOS circuits will be presented and characterized, as well as the effects of frequency and voltage variation.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work, inside and out of class.

Evaluation criterion

Weighted average of the test notes and group work or individual.

Recovery

Approval Criteria: $NP + (MREC/2.5)$, if $MREC > 7.5$; or $\max\{np, mrec\}$, if $mrec \leq 5.0$; or 5.0, if $5.0 \leq mrec < 7.5$. ($NP = 1^{\text{st}}$ evaluation, $MREC = \text{recovery test}$).

Basic bibliography

Textbook:

- Annibal, Hettem Jr, Fundamentals of Computing Electronic Informatics.

Complementary Bibliography:

- SEDRA, SMITH, Microeletrônica, Makron Books, 2000.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Production of material as an educational resource or others for use by the external community (eg, college entrance exams, high school, vocational courses, etc.). Development of projects that solve problems of the external community. Participation in fairs or proposal of activities for society.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

São Carlos Physics Institute

IFSC Interdepartal Disciplines

Discipline: 7600105 - Basic Physics I

Basic Physics I

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2022 **Deactivation:**

Goals

Responsible teacher (s) (s)

2055371 - Valmor Roberto Mastelaro

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Evaluation may include theoretical tests (documented written and/or oral orals), directed activities, online exercise lists, special activities, seminars, not being limited to a single method.

Evaluation criterion

At the beginning of the classes the student should be informed of the evaluation criteria adopted by the teacher.

Recovery

A must -proof + work (optional), at the discretion of the teacher. Approval Criterion: Arithmetic average of the first evaluation and recovery grade, which should be 5.0 or greater. Time of achievement: Up to one week before the date for delivery of the notes.

Basic bibliography

P. A. Tipler - Physics, Volume I, 4th Edition.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0201 - Introduction to Computer Science II

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Extension workload: 5 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Presentation of advanced concepts that take the student to a maturity level of structured programming, with knowledge of a programming language with advanced features. Learning techniques for constructing algorithms and for analysis of the algorithms' complexity. Learning classical sorting and internal memory searching algorithms. Practice of Programming.

Responsible teacher (s) (s)

6116132 - Moacir Antonelli Ponti

Menu

Introduction to advanced concepts in structured programming language. Analysis of algorithms: complexity criteria. Asymptotic notation. Analysis on the worst case, best case and average case. Paradigms of algorithms design (induction, recursion, divide and conquer, etc.). Direct and advanced sorting algorithms (insertion sort, selection sort, partition sort). Searching algorithms in internal memory (direct, sequential, indexed). Scattering (hashing).

Syllabus

Analysis of algorithms: basic concepts, complexity criteria of time and space, asymptotic notation, analysis on the worst case, best case and average case, techniques for counting operations and recurrences analysis, practice and discussion with relevant computational problems. Simple and advanced sorting algorithms in internal memory: basic concepts, bubble sort, quick sort, insertion sort, shell sort, selection sort, heap sort, merge sort, minor counting, type counting and radix sort, analysis of sorting algorithms, practice and discussion with relevant computational problems. Internal searching algorithms: basic concepts, methods for sequential search, indexed and sequential search, binary and interpolation search, analysis of previous search algorithms and considerations on search trees, practice and discussion with relevant computational problems. Internal Hashing: basic concepts, types of hash, hash functions, collision handling, analysis of search algorithms, insertion and removal based on hashing. Algorithm design paradigms: basic concepts, paradigms of induction, recursion, trial and error, divide and conquer, dynamic programming, greedy algorithms, and approximation algorithms, practice and discussion with relevant computational problems.

Evaluation instruments and criteria

Evaluation method

Exhibition and exercise resolution classes.

Evaluation criterion

The final grade will be calculated by the weighted average of the test grades and exercises obtained by the student over the semester.

Recovery

Realization: Until the first week of later semester classes -Approval Criterium: $NP + (MREC/2.5)$, if $MREC >$ or = 7.5; or max {np, mrec}, if mrec <or = 5.0; or 5.0 <or = mrec <7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

- Text book:
 - CORMEN, T.H. et al.: Algorithms: theory and practice. Elsevier and Campus. ISBN 853520926-3.
 - CORMEN, T.H.; LESERSON, C.E.; RIVEST, R.L.; STEIN, C. Algorithms: Theory and Practice. Campus Editor.
 - KELLEY, A.; POHL, I. A Book on C. 2a. edição, The Benjaamin/Cummings Pub. Co., Inc. 1990.
 - SCHILDT, H. "C.Completo e Total". MakronBooks, 1997.
 - TENENBAUM, A.M., e outros Data Structures Using C. Prentice-Hall, 1990.
 - Ziviani, N. Algorithms Project. 2a. Edition, Thomson, 2004
- Complementary bibliography:
 - GRIES, D. The Science of Programming. Berlin, Springer, 1981.
 - KERNIGHAM, B.; RITCHIE, D. The C Programming Language. Prentice-Hall, 1988.
 - Kernigham, B.W.; RITCHIE, D.M.C. The standard ASI programming language. Campus Publisher, 1995.
 - Horowitz e.; SAHNI, S. Fundamentals of data structure. Rio de Janeiro, Campus Publisher, 1986.
 - ROBERTS, E. Programming Abstractions in C. Addison Wesley, 1996.
 - SEDGEWICK, R. Algorithms in C. Addison-Wesley, 1990.
 - SHOOMAN, M.L. Software Engineering. New York, McGraw-Hill, 1983.
 - SZWARCFITER, J. L.; MARKENZON, L. Data structures and their algorithms. Technical and Scientific Books, 1994.
 - WIRTH, N. Algorithms + Data Structures = Programs. Prentice-Hall, 1986.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Dissemination of content about algorithms (ordering, search, hashing) and its computability.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0202 - Algorithms and Data Structures I

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 01/01/2009 **Deactivation:**

Goals

Familiarize students with the various structures of information, seeking to enable them to rely on these resources in the development of other computer science activities.

Menu

Syllabus

Abstract data types. Linear lists: simply and doubly linked, static and dynamic, circular, with knot-head. Basic operations on linear lists and analysis of algorithms. Stacks, queues, priority queues, basic operations on stacks and queues and analysis of algorithms. Applications of linear lists, stacks and queues in relevant computational problems. Sparse matrices. Generalized lists and applications. Nonlinear lists: trees, binary trees, basic operations on trees and analysis of algorithms. Binary search trees, balanced binary search trees, AVL trees, basic operations and analysis of algorithms. Considerations on heaps applied on priority queues. Applications of nonlinear lists in relevant computational problems and analysis of algorithms.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work, inside and out of class. Computer use practice.

Evaluation criterion

Recovery

Realization: Until the first week of later semester classes -Approval Criterium: $NP + (MREC/2.5)$, if $MREC > 0$ or $= 7.5$; or max {np, mrec}, if mrec < 0 or $= 5.0$; or $5.0 < mrec < 7.5$. (np = 1st evaluation, mrec = proof)

Basic bibliography

- Text book:
 - CORMEN, T.H.; LESERSON, C.E.; RIVEST, R.L.; STEIN, C. *Algorithms: Theory and Practice*. Campus Editor.
 - GOODRICH, M. T.; Tamassia, R., *Data Structures and Algorithms*, Wiley, 2004.

- SZWARCFITER, J. L.; MARKENZON, L. Data structures and their algorithms, technical and scientific books, 1994.

(*) 2nd period for the Bel. Computer Science and Bel. Mathematics and 6th period for Lic. in mathematics.

- TENEMBAUM, A.M., e outros Data Structures Using C, Prentice-Hall, 1990.

- ZIVIANI, N., Project of algorithms with implementations in Pascal and C., Thompson, 2a. Ed, Sao Paulo, 2004.

• Complementary bibliography:

- AHO,A.V.; HOPCROFT,J.E.; ULLMAN,J.D. Data Structure and algorithms. Readings, Addison Wesley, 1982.- COLLINS, W.J. - Programação Estruturada com Estudo de Casos em Pascal, McGraw Hill, 1988.- HOROWITZ,E.; SAHNI,S. Fundamentals of Data Structures in Pascal, Computer Science Press, 4th Edition, 1994.- LANGSAM, Y. Et al Data Structures using C And C++, 2nd edition, Prentice-Hall, 1996.- WEISS, M. A. - Data Structures and Algorithm Analysis, The Benjamin/Cummings Pub. Co., 1995.- WIRTH,N. Algorithms and Data Structures, Englewood Cliffs, Prentice-Hall, 1986.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SMA0180 - Discrete Mathematics I

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 15/07/2019 **Deactivation:**

Goals

Provide students basic knowledge of Counting and Combinatorics, Relationships, Number Theory in the context of Cryptography, Inference and Proof, and Mathematical Induction, enabling them to solve problems in the area of Computer Science.

Responsible teacher (s) (s)

5521376 - Eugenio Tommaso Massa

5765587 - Paulo Leandro Dattori da Silva

Menu

Counting and Combinatorics, Relationships, Theory of Numbers in the context of Cryptography, Inference and Proof, and Mathematical Induction.

Syllabus

Counting and combinatorics: addition principles, product principles, lists, factorial, arrangement, permutations, combinations, with and without repeating elements, subsets and Pascal triangle; Relationships: concept, functions as relations, properties, equivalences, partial and total orders: and the Shelf Storage problem; Theory of Numbers and Cryptography: secret key, public key systems, encryption using n-module arithmetic, common maximum divisor, Euclid's Division Theorem, Euclid's algorithm, exponential modulus n, and RSA cryptosystem; Inference and proof: rules of inference, direct proof, proof by induction, proof by contradiction, proof by construction and proof by absurdity; Mathematical Induction: principles, strong induction, recursive vision, structural induction, recurrences and the Master Theorem.

Evaluation instruments and criteria

Evaluation method

Evidence, work, exercises and seminars related to the concepts treated in the classes. Minimum of two tests.

Evaluation criterion

NP = Weighted average of tests combined with notes of the work, exercises and seminars, at the teacher's discretion.

Recovery

NP+(MREC/2.5), if MREC> or = 7.5; or max {np, mrec}, if mrec <or = 5.0; or 5.0, if 5.0 <or = mrec <7.5. (NP = 1st evaluation, MREC = Recovery Test Note).

Basic bibliography

Stein, C; DRYSDALE, R; Bogart K. Discrete Mathematics - For Computer Science. 1st edition, Pearson, 2015.

GERSTING, J. L. Mathematical foundations for computer science: a modern treatment of discreet mathematics. LTC Publishing House, 2017.

MENEZES, P. B. Discrete Mathematics for Computing and Informatics. Bookman Publishing House, 2013.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SMA0354 - Calculus II

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2015 **Deactivation:**

Goals

Students should be able to understand the meaning of definite integrals and how to compute them. They also should be able to understand the meaning of limit, continuity, and differentiability of functions of several variables.

Menu

Definite integral. Integration techniques. Improper integrals. Several variable functions. Limit. Partial derivatives. Maxima and minima.

Syllabus

Definite integral. Integration techniques. Definite integral applications. Improper integrals. Curves. Several variable functions. Limit. Partial derivatives. The chain rule and applications. Gradient and directional derivatives. Tangent planes and normal lines. Taylor polynomial. Maxima and minima of several variable functions. Lagrange multipliers.

Evaluation instruments and criteria

Evaluation method

Exhibition in classes and fixation through exercise, with the guidance of the teacher.

Evaluation criterion

Evaluation through written tests, works and seminars.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests.

Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

Mf = 5 if 5 < you = Mr < you = (10 - ms);

MF = (MS + MR) / 2 se MR > 10 - MS

MF = MS se MR < 5.

Basic bibliography

TEXT BOOKS:

- GUIDORIZI, H.L. A calculation course, 5th ed., V. 1, Rio de Janeiro: Technical and Scientific Books Editora, (2001).
Stewart, J. Calculus, V. 1 and 2, 4th ed., Pioneer, São Paulo, (2001).
Thomas, G.B. Calculation, V. 1, 10th ed., Addison-Wesley, São Paulo, (2002).
Táboas, P.Z. Differential and integral calculation in the line, class grades, ICMC-USP.
CARVALHO, A.N.; NUNES, W.V.L.; ZANI, S.L. ICMC-USP CALCULATION NOTES.
MENDES, C.M. Class Notes, functions of various variables – parameterized curves, (2005).
MENDES, C.M. Class notes, functions of various variables – differentiation, (2005).

Complementary:

- Swokowski, E.W. Calculation with Analytical Geometry, V. 1 and 2, 2a. Edition, Makron-Books of Brazil Editora Ltda, Rio de Janeiro, (1995).
SIMMONS, G.F. Calculation with Analytical Geometry, V. 1 and 2, MC Graw-Hill of Brazil, Rio de Janeiro, (1987).

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0108 - Digital Systems: Laboratory Practice

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Extension workload: 15 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Extend student knowledge with practices in digital techniques, with an emphasis on sequential circuit design.

Menu

Practice in sequential circuits, Flip-flops, counters and finite state machines.

Syllabus

Practice in sequential circuits, flip-flops, registers, series / parallel and parallel / series converters, synchronous and asynchronous counters, memory. Finite state machines-FSM. Optimization techniques for finite state machines. Design of sequential logic circuits for the execution of binary instructions.

Evaluation instruments and criteria

Evaluation method

Exhibition and exercise resolution classes.

Evaluation criterion

Weighted average of the test notes and group work or individual.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC >= 7.5; or max {np, mrec}, if mrec <= 5.0; or 5.0, if 5.0 <= mrec < 7.5. (np = 1st evaluation, mrec = recovery proof)

Basic bibliography

Texto:

- BROWN, S.; VRANESIC, Z. Fundamentals of Digital Logic with VHDL Design, McGraw Hill, 2005.
- IDOETA, I.V.; CAPUANO, F.G. Elementos de Eletrônica Digital, Livros Érica, 2007.

Bibliografia Complementar:

- HALL, D.V. Digital Circuits and Systems, McGraw-Hill Publishing Company, 1989.

- BROWN, STEPHEN D.; Field-programmable gate arrays; Kluwer Academic Publishers, 1992.
- WAKERLY, J. F. Digital Design: Principles & Practices, 3 Edition, 950 páginas, Prentice Hall, 2000.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Material production as an educational resource using digital circuits for the teaching / resolution of society with digital circuits.

Activity evaluation indicators

Evaluation of the activities developed by the participating community. Evaluation of receptivity and community participation in proposed activities.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0118 - Digital Systems

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 01/01/2017 **Deactivation:**

Goals

To extend the knowledge of the students in digital techniques, with emphasis on sequential circuit design.

Menu

Sequential circuits, Flip-flops, counters and finite state machines.

Syllabus

Sequential circuits, Flip-flops, registers, parallel/serial and serial/parallel converters, synchronous and asynchronous counters, memory, Finite State Machines – FSM. Optimization techniques for finite state machines. design of sequential logical circuits for the execution of binary instructions.

Evaluation instruments and criteria

Evaluation method

Exhibition and exercise resolution classes.

Evaluation criterion

Weighted average of the test notes and group work or individual.

Recovery

Approval Criteria: $NP + (MREC/2.5)$, if $MREC >= 7.5$; or $\max\{np, mrec\}$, if $mrec \leq 5.0$;
or 5.0, if $5.0 \leq mrec < 7.5$. ($np = 1st$ evaluation, $mrec = recovery$ proof)

Basic bibliography

Text:

- BROWN, S.; VRANESIC, Z. Fundamentals of Digital Logic with VHDL Design, McGraw Hill, 2005.
- IDETA, I.V.; CAPUANO, F.G. Elements of Digital Electronics, Books Érica, 2007.

Complementary Bibliography:

- HALL, D.V. Digital Circuits and Systems, McGraw-Hill Publishing Company, 1989.
- BROWN, STEPHEN D.; Field-programmable gate arrays; Kluwer Academic Publishers, 1992.

- WAKERLY, J. F. Digital Design: Principles & Practices, 3 Edition, 950 páginas, Prentice Hall, 2000.

[Additional information on the current class schedule \(in Portuguese\)](#)

São Carlos Physics Institute

IFSC Interdepartamental Disciplines

Discipline: 7600109 - General Physics Laboratory I

General Physics Laboratory I

Class Credits: 2

Work Credits: 0

Total workload: 30 h

Type: Semester

Activation: 01/01/2022 **Deactivation:**

Goals

Responsible teacher (s) (s)

2055371 - Valmor Roberto Mastelaro

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Online exercises, practical and theoretical tests.

Evaluation criterion

At the beginning of the classes the student should be informed of the evaluation criteria adopted by the teacher.

Recovery

In view of the characteristics of the discipline, recovery will not be offered.

Basic bibliography

Handouts of the IFSC/USP Physics Teaching Laboratory.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0215 - File Organization

Class Credits: 3

Work Credits: 2

Total workload: 105 h

Type: Semester

Activation: 01/01/2020 **Deactivation:**

Goals

Provide students with notions of storage files, indexing techniques, data structure and efficient mechanisms for data recovery in secondary memory.

Menu

Fundamentals of files and secondary storage. Indexing and sorting of large files. B-Trees and its variations.

Syllabus

Fundamentals of files and secondary storage. Organizing files. Fields and fixed length records and variable. Indexing files. Data structures and algorithms for indexing primary, secondary and multiple keys. Maintenance of files indexed dynamic. Processing cosequential. Sorting large files. B-Trees and its variations. external Hashing.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work, inside and out of class. Computer use practice.

Evaluation criterion

Weighted average of the test notes and group work.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC >= 7.5; or max {np, mrec}, if mrec < 5.0;
or 5.0, if 5.0 <= mrec < 7.5. (NP = 1st evaluation, MREC = proof).

Basic bibliography

Text:

- FOLK, M.; ZOELLICK, B., File Structures, Second Edition. Addison-Wesley, 1992.

Complementary Bibliography:

- AHO,A.V.; HOPCROFT,J.E.; ULLMAN,J.D. Data Structure and Algorithms. Readings, Addison Wesley, 1982.
- TENEMBAUM,A.M. et alli Data Structures Using C, Prentice-Hall, 1990.

- FOLK, M.; ZOELLICK, B., & RICCARDI, G., File Structures, An Object-Oriented Approach Using C++, Third Edition. Addison-Wesley, 1998.
- ZIVIANI, N. - Project of algorithms: with implementations in Pascal and C. 2a. Edition. Pioneer Thomson Learning, 2005.
- CORMEN, T.H.; LESERSON, C.E.; RIVEST, R.L.; STEIN, C. Algorithms: Theory and Practice. Campus Editor. 2002.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0216 - Computational Modelling in Graphs

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 01/01/2020 **Deactivation:**

Goals

Teach students the importance of graphs in computing, showing their fundamental concepts and main data structures, as well as major applications resolved through graphs.

Menu

Fundamental concepts in graphs, data structures for graphs, applications.

Syllabus

Graphs - basic concepts, directed and undirected graphs, weighted graphs, Eulerian and Hamiltonian paths, cycles, basic operations on graphs, breadth and depth search, isomorphism. Representation of graphs via adjacency matrix and adjacency lists, operations, and algorithm analysis. Shortest paths, cycle detection, connected and strongly connected components, bridges and articulation vertices, topological sort. Minimum spanning trees, shortest paths, network flow. Basic notions of complex networks and applications.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work, inside and out of class. Computer use practice.

Evaluation criterion

Weighted average of the test notes and group work.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC >= 7.5; or max {np, mrec}, if mrec < 5.0;
or 5.0, if 5.0 <= mrec < 7.5. (NP = 1st evaluation, MREC = proof).

Basic bibliography

Text:

CORMEN, T.H.; LESERSON, C.E.; RIVEST, R.L.; STEIN, C. *Algorithms: Theory and Practice*. Campus Editor. 2002.

- ZIVIANI, N. - *Project of algorithms: with implementations in Pascal and C*. 2a. Edition. Pioneer Thomson Learning, 2005.

Complementary Bibliography:

- HOROWITZ,E.; SAHNI,S. Fundamentals of Data Structures in Pascal, Computer Science Press, 1990.
- TENEMBAUM,A.M. et alli Data Structures Using C, Prentice-Hall, 1990.
- Szwarcfiter, J.L. Graphs and computing algorithms. Editor Campus, 1983.
- AHO,A.V.; HOPCROFT,J.E.; ULLMAN,J.D. Data Structure and Algorithms. Readings, Addison Wesley, 1982.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SMA0355 - Calculus III

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2012 **Deactivation:**

Goals

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Exhibition in classes and fixation through exercise, with the guidance of the teacher.

Evaluation criterion

Evaluation through written tests, works and seminars.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests.

Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

Mf = 5 if $5 \leq \text{you} = \text{Mr} \leq \text{you} = (10 - \text{ms})$;

MF = $(\text{MS} + \text{MR}) / 2$ se $\text{MR} > 10 - \text{MS}$

MF = MS se $\text{MR} < 5$.

Basic bibliography

TEXT BOOKS:

- OAK, A.N.; NUNES, W.V.L.; ZANI, S.L. ICMC-USP CALCULATION NOTES.
- Guidorizzi, H.L. A calculation course, 5th ed., V. 2 and 3, Rio de Janeiro: Technical and Scientific Books Editora, (2002).
- Stewart, J. Calculation, V. 1 and 2, 4th ed., Pioneer, São Paulo, (2001).
- Thomas, G.B. Calculation, V. 2, 10th ed., Addison-Wesley, São Paulo, (2002).

Complementary:

- MENDES, C.M. Line and surface integral class notes, ICMC.
- MENDES, C.M. Calculation class notes III, ICMC-USP.

- SIMMONS, G.F. Calculation with Analytical Geometry, V. 2, MC Graw-Hill of Brazil, Rio de Janeiro, (1987).
- Swokowski, E.W. Calculation with Analytical Geometry, V. 2, 2a. Edition, Makron-Books of Brazil Editora Ltda, Rio de Janeiro, (1995).

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0103 - Object-Oriented Programming

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 15/07/2022 **Deactivation:**

Goals

Introduce the object oriented programming and object oriented software development concepts.

Responsible teacher (s) (s)

3039263 - Adenilso da Silva Simão

1402765 - Márcio Eduardo Delamaro

Menu

Object oriented design. Encapsulation and information hiding. Implementation and behavior separation. Classes and subclasses. Inheritance. Polymorphism. Class hierarchy.

Syllabus

Object oriented design. Encapsulation and information hiding. Implementation and behavior separation. Classes and subclasses. Inheritance: overriding, dynamic dispatch. Polymorphism: relation between subtype polymorphism and inheritance. Class hierarchy. Learning goals: 1) Justify the philosophy of object-oriented design and the concepts of encapsulation, abstraction, inheritance, and polymorphism; 2) Design, implement, test, and debug simple programs in an object-oriented programming language; 3) Describe how the class mechanism supports encapsulation and information hiding; 4) Design, implement, and test the implementation of "is-a" relationships among objects using a class hierarchy and inheritance; 5) Compare and contrast the notions of overloading and overriding methods in an object-oriented language.

Evaluation instruments and criteria

Evaluation method

Expository theoretical classes, accompanied by exercises and practical work. Study directed with activities using laboratory microcomputers.

Evaluation criterion

Weighted average of evidence, exercises and practical work performed throughout the discipline.

Recovery

Approval criteria: NP+(MREC/2.5), if MREC > or = 7.5; or max {np, mrec}, if mrec <= 5.0; or 5.0, if 5.0 <= mrec <7.5. (Np = 1st evaluation, mrec = proof)

Basic bibliography

Text Book:

- Deitel, H. M.; Deitel, P.J.: Java - How to Program, Prentice -Hall, 8th Edition, 2010, ISBN 9788576055631.
- Deitel, H. M.; Deitel, P.J.: C ++ - How to program, Prentice -Hall, 5th Edition, 2006, ISBN 9788576050568.

Complementary Bibliography:

- FILHO, A. M. S. - Introduction to C ++ Object Oriented Programming, Campus Publisher, 2010, ISBN 9788535237023.
- Eckel, b.: Thinking in Java, Prentice Hall, 4th edition, 2006, ISBN 9780131872486
- Eckel, b.: Thinking in C ++, vol 1, Prentice Hall, 2nd edition, 2000, ISBN 9780139798092.
- BORATTI, I. C. - Object oriented programming in Java, Visual Books, 2007, ISBN 9788575021996.
- Thomas, D.; Hansson, D.; BREEDT, L.; CLARK, M. Agile Web Development with Rails. 2nd edition. (Paperback, Dec 14, 2006).

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0902 - Organization and Architecture of Computers

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 15 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

To study current concepts about organization and architecture of digital computers. To study functional, structural and performance aspects of processors, memories and subsystem of Input/Output with their interconnection networks. To understand techniques of optimization and parallelization of processors, considering the level below the instruction set architecture. To learn to code programs in assembly language.

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Understanding of assembly languages; Organization of processors and their basic elements; Instruction cycle; hardwired and microprogrammed control unit; Parallelism of the microarchitecture level; Memory subsystem; Input/OutPut (I/O) and its interconnection systems.

Syllabus

Understanding of assembly: important aspects when designing machine and assembly languages; coding assembly programs; Organization of processors, basic elements and fundamental concepts; Implementing instruction cycle: structural, functional and performance aspects of the microarchitecture level; RISC architecture. Hardwired and microprogrammed control units: fundamentals and development. Parallelism below microarchitecture level (pipeline, superscalar and multithreading): solutions for structural, control and data hazards Memory subsystems: structural, functional and performance aspects of cache and main memory; Input/Output (I/O): organization, techniques and evolution of I/O hardware. Current interconnection systems: general concepts and case studies. Bus.

Evaluation instruments and criteria

Evaluation method

Exhibition of the contents. Exercise development and practical work during classes and extra-class.

Evaluation criterion

Notes will be assigned to exercises and practical work developed during the course, as well as the evaluations (tests) applied during the semester. The final grade will represent the weighted average of the students obtained by the student during the semester.

Recovery

For recovery approval (final grade <5), this criterion should be used: $(np-2) / 5 * mrec + 7-np$, if $mrec \geq 5$; or $\max\{np, mrec\}$, if $mrec < 5$

Basic bibliography

Livro Texto

PATTERSON, D. A., HENNESSY, J.L. Computer Organization and Desing, Fifth Edition: The Hardware/Software Interface. The Morgan Kaufman Series in Computer Architecture and Desing. Octover 10, 2013 /ISBN-10: 0124077269 / ISBN-13: 978-0124077263;

Bibliografia Complementar:

STALLINGS, W. Computer Organization and Architecture: 9th Edition. March 11, 2012, ISBN-10: 0273769197, ISBN-13: 978-0273769194 Pearson Education;
TANENBAUM, A.S. Structured Computer Organization. 6th Edition. Pearson Education. April 1, 2012, ISBN-10: 0273769243 - ISBN-13: 978-0273769248.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of open educational resources for teaching

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in proposed activities. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0960 - Functional Programming

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 01/01/2022 **Deactivation:**

Goals

Introduce the basic concepts of functional programming to undergraduate students. Develop the necessary skills so that the future developer of such programs can create adequate solutions, with high performance and quality.

Responsible teacher (s) (s)

3039263 - Adenilso da Silva Simão

1402765 - Márcio Eduardo Delamaro

1629326 - PAULO SERGIO LOPES DE SOUZA

Menu

History, basic concepts and current status of the functional paradigm. Modern functional languages. Examples of functional extensions of traditional languages. High order functions, and closure. Expression evaluation: sequential, concurrent and distributed examples. Advanced topics in functional programming.

Syllabus

History, basic concepts and current status of the functional paradigm: introduction to the functional paradigm, comprising lambda functions and expressions, higher-order functions, and other functional concepts applied in modern functional languages. Development of programs in modern functional languages. Examples of programs in languages that incorporate functional aspects. Advanced topics in functional languages: application of functional languages in problem-solving.

Evaluation instruments and criteria

Evaluation method

Expository theoretical classes, accompanied by exercises and practical work. Study directed with activities using laboratory microcomputers.

Evaluation criterion

Weighted average of evidence, exercises and practical work performed throughout the discipline.

Recovery

$\text{NP} + (\text{MREC}/2.5)$, if $\text{MREC} >= 7.5$; or $\max \{\text{np}, \text{mrec}\}$, if $\text{mrec} <= 5.0$; or 5.0, if $5.0 <= \text{mrec} < 7.5$ ($\text{np} = 1\text{st evaluation}$, $\text{mrec} = \text{proof}$).

Basic bibliography

Livro Texto

Ford, Neal. Functional Thinking: Paradigm Over Syntax. O'Reilly Media, 2014.

Bibliografia Complementar

Backfield, Joshua. Functional: Steps for Transforming Into a Functional Programmer. O'Reilly Media, 2014.

Laurent, Simon St.; Introducing Erlang, 2nd Edition, O'Reilly Media., 2017, ISBN: 9781491973370

Juric, Sasa; Elixir in Action, Second Edition, Manning Publications, 2019, ISBN: 9781617295027

Kurt, Will; Get Programming with Haskell, Manning Publications, 2018

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0218 - Advanced Algorithms and Applications

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Extension workload: 5 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

To improve the ability to implement complex programming algorithms. This objective should be achieved by solving problems according to a) programming paradigms: brute force (backtracking), greedy algorithms, divide and conquer (binary search), Dynamic Programming and b) topics with important applications in professional practice such as: graphs, strings, number theory and game theory.

Responsible teacher (s) (s)

793065 - John of the Holy Spirit Batista Neto

Menu

Appropriate use of data structures to reduce code complexity; Programming Paradigms (Brute Force/Backtracking; Alg. Greedy, Divide and Conquer/Binary Search and Dynamic Programming. Advanced topics in Graphs; Strings, Number Theory and Game Theory.

Syllabus

Efficient use of data structures to reduce code complexity (C++ STL: Maps, Sets, bitmasks, Union Find, for example); Paradigms: Brute Force and Backtracking, Greedy Algorithms, Divide and Conquer (Binary Search) and Dynamic Programming. Advanced topics in Graphs: Flow, Strongly Connected Components; String Manipulation (KMP, Trie, Suffix Tree), Number Theory (Prime Numbers, factoring, modular arithmetic, MDC); Game Theory (Nim Game).

Evaluation instruments and criteria

Evaluation method

Exhibition classes and especially resolution of code in the classroom by the teacher.

Evaluation criterion

Through practical exercises (submitted in automatic correction system), 1 (or 2, depending on the difficulty) per class.

Recovery

Written test or practical work: approval criteria: $NP + (MREC/2.5)$, if $MREC >= 7.5$; or max {np, mrec}, if $mrec < 5.0$; or 5.0, if $5.0 \leq mrec < 7.5$. (NP = 1st evaluation, MREC = proof).

Basic bibliography

Kleinberg and Tardos. Algorithm Design. 1st Edition, 2009. - Cormen, T. Algoritmos: teoria e prática, 2012. - LEVITIN, A. The Design and Analysis of Algorithms. 2nd Edition, 2007. Bibliografia Complementar: - Laaksonen, A.. Guide to Competitive Programming: Learning and Improving Algorithms Through Contests, 2018. - Halim, S. Competitive Programming 3, 2013.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Disclosure of content on the web about advanced algorithms seen in the room.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SME0123 - Statistics

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2012 **Deactivation:**

Goals

Teaching of the basic ideas of statistics, its scope and limitations. Establish a common language between engineers and statisticians. Give examples and applications of the most common techniques of Statistics.

Menu

Syllabus

Exploratory data analysis. Probabilistic space. Probabilistic models. Dependence and independence of events. Events conditioned. One dimensional and n-dimensional random variables. Probability distributions. Functions of random variables. Expectation. Moments of a distribution. Covariance and correlation. The Central limit theorem. Parameter estimation. Tests of hypotheses. Adherence tests. Linear regression.

Evaluation instruments and criteria

Evaluation method

Exhibition in classes, fixation through class and out-of-class exercises, whether or not using computers.

Evaluation criterion

Notes will be assigned to exercises and practical work performed some in class and others out of class. The final grade will be calculated by the weighted average.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests.

Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

$$MF = 5 \text{ se } 5 \leq MR \leq (10 - MS)$$

$$MF = (MS + MR) / 2 \text{ se } MR > (10 - MS)$$

$$MF = MS \text{ se } MR < 5$$

Basic bibliography

Text Book:

MAGALHÃES, M.N.; LIMA, A.C.P. Notions of probability and statistics - 6a. Edition - EDUSP, 2004.

Complementary Bibliography:

ACHCAR, J.A.; RODRIGUES, j. Class Notes, ICMSC-USP.-
BUSSAB, W.O.; MORETTIN, P.A. Basic Statistics, 5th. Ed., Sao Paulo, Saraiva, 2002.-
WALPOLE,R.E.; MYERS,R.H. Probability and Statistics for Engineers and Scientists, 5 th ed, Mcmillan Pub. Camp., 1993.-
MONTGOMERY, Douglas C.; GOLDSMAN, David M.; Hines, William W. Probability and Statistics in Engineering, 4. Ed., LTC Publishing House, 2006.-
MONTGOMERY, Douglas C.; HELERO, Norma Francis; RUNGER, George C. Applied Engineering Statistics. 2. Ed., LTC Publishing House, 2004.-
DEVORE, Jay L. Probability and statistics for engineering. Thompson Pioneer Publisher, 2006.-
ROSSO, Renzo; KOTTEGODA, Nathabandu T. Statistics, Probability and Reliaability for Civil and Environmental Engineering. McGraw-Hill, 1997.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SME0142 - Linear Algebra and Applications

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Type: Semester

Activation: 01/01/2023 **Deactivation:**

Goals

The course aims to introduce concepts of linear algebra and its applications, aiming mainly to offer the necessary foundations for the other courses.

Responsible teacher (s) (s)

3223814 - Luis Gustavo Nonato

Menu

Vector spaces and subspaces, linear transformations, eigenvalues and eigenvectors, applications in data analysis.

Syllabus

Analytical Geometry Basics: Cartesian coordinates, Vectors, Dot product, Vector product. Lines and planes. Conics. Reduced equations of quadric surfaces. (Content in a maximum of 4 lessons in 2 weeks). Basics: Vector spaces, linear dependence, base and dimension, subspaces, direct sum. Linear transformations, kernel and image, matrix of a linear transformation. Rank of a linear transformation. Orthogonality and orthogonal operators, subspace projections, least squares and linear regression. Eigenvalues and eigenvectors, invariant subspaces, spectral theorem, quadratic forms and Rayleigh coefficient. Singular value decomposition (SVD) and low rank approximation. Applications: Principal component analysis (PCA) and dimensionality reduction.

Evaluation instruments and criteria

Evaluation method

Evaluation through written evidence and practical work.

Evaluation criterion

Notes will be assigned to tests and practical work, some in class and others out of class. The final grade will be calculated by a weighted average of the students obtained by the student during the semester.

Recovery

The final grade (MF) of the student who took recovery test will depend on the semester average (MS) and the average recovery test (MR), as follows:

- $mf = 5$ if $5 \leq mr \leq (10 - ms)$
- $mf = (ms + mr) / 2$ if $mr > (10 - ms)$
- $mf = ms$ if $mr < 5$

Basic bibliography

Livro-texto:

- BOULOS, P., CAMARGO, I., Geometria analítica - um tratamento vetorial, Rio de Janeiro: McGraw-Hill, 1987.
- Gilbert Strang, Álgebra Linear e Suas Aplicações, CENGAGE LEARNING, 2001

Bibliografia Complementar:

- Carl D. Meyer, Matrix Analysis and Applied Linear Algebra Book and Solutions Manual, SIAM, 2001
- CALLIOLI, C.A; H.H. DOMINGUES E R.C.F. COSTA. Álgebra Linear e Aplicações, 6 ed, São Paulo: Atual, 2007.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0124 - Object-Oriented Analysis and Design

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Extension workload: 15 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

The goal of this course is to make possible the students analyze and design object-oriented software systems using design patterns and following the Unified Process.

Menu

To present the Unified Process and UML, as well as design patterns, in order to analyze and design object-oriented software systems.

Syllabus

Overview of the methods for object-oriented analysis and design, including the Unified Process. Modeling of software systems using UML: structural models, behavioral models, and interaction models. Design patterns and responsibility attribution patterns. Coding from design models. Issues related to persistence. Supporting tools.

Evaluation instruments and criteria

Evaluation method

Theoretical classes followed by application exercises and questions.

Evaluation criterion

Weighted average of the test notes and group work.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC > or = 7.5; or max {np, mrec}, if mrec < or = 5.0; or 5.0, if 5.0 < or = mrec < 7.5.
(np = 1st evaluation, mrec = proof).

Basic bibliography

Text Book:

LARMAN, C. Using UML and Patterns: Using UML and Patterns: An Introduction to Analysis and Design Object Oriented and Iterative Development. 3rd edition, Bookman, Porto Alegre, 2006.

WAZLAWICK, R.S. Analysis and design of object -oriented information systems. 2a. Edition, Campus Publisher, 2011.

Complementary Bibliography:

- Object Management Group. UNIFIED MODELING LANGUAGE. (<https://www.omg.org/spec/uml/about-uml/>)
- VALENTE, M. T. Modern Software Engineering: Productivity Software Development Principles and Practices, 2020 (<https://engsoftmoderna.info/>).
- Rumbaugh, J., Jacobson, I., Booch, G.; The Unified Modeling Language Manual Reference, Addison-Wesley, 1999.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Systems modeling of society as a way to exercise techniques seen in the classroom, offering solutions that are documented and available for future support software development.

Activity evaluation indicators

Evaluation of the activities developed by the participating community. Evaluation of receptivity and community participation in proposed activities. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions to the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0140 - Operating Systems I

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Extension workload: 30 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Introduce the student to the basic concepts and principles of digital computer operating systems.

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

History and evolution, types of operating systems, operating systems services, operating system structure, processes, communication between processes, classical problems, scheduling, principles of input/output, hardware aspects, software aspects, deadlocks. Memory management, basic principles, paging, multiprogramming, virtual memory, replacement pages algorithms, cache, cache handling algorithms. File system, user vision, project guidelines, reliability, security and performance aspects, file servers.

Syllabus

History and evolution, types of operating systems, operating systems services, operating system structure, processes, communication between processes, classical problems, scheduling, principles of input/output, hardware aspects, software aspects, deadlocks. Memory management, basic principles, paging, multiprogramming, virtual memory, replacement pages algorithms, cache, cache handling algorithms. File system, user vision, project guidelines, reliability, security and performance aspects, file servers

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work, performed in and out of class. Practice and use of the computer.

Evaluation criterion

Weighted average notes in tests and works.

Recovery

$(NP - 2) / 5 * MREC + 7 - NP$, if $MREC >= 5$; or $\max \{np, mrec\}$, if $mrec < 5$

Basic bibliography

Text Book:

- Silberschatz, A., Galvin, P.B., Gagne, G., Fundamentals of Operating Systems, Treation Aldir Coelho Corrêa da Silva., 8th Edition, 2011, Ltc.
- TANENBAUM, A.S. Modern Operating Systems, translation Ronaldo A. L. Gonçalves, Luís A. Consularo, Luciana do Amaral Teixeira, Technical Review Raphael Y. de Camargo, 3rd edition, 2010. Pearson
- TANENBAUM, A.S.; WODHULL, A.S.; Operating Systems: Design and Implementation. Prentice Hall, 2008, 3rd edition.

Complementary Bibliography:

- OLIVEIRA, R., Toscani, S., Carissimi, A.S.; Operating systems. Book 11 of the series textbooks of the UFRG Institute of Informatics, 2nd. Ed., Publisher Sagra Luzzato, 2001.
- Machado, F. B., Maia, L. P. Operating Systems Architecture. LTC Publisher. 4th edition. 2007.
- STALLINGS, W. Operating Systems: Internals and Design Principles, Prentice Hall, 2004, 5a edição, ISBN 0131479547.
- Deitel, H.M.; DEITEL, P.J.; CHOFFNES, D.R. Operating Systems. Prentice Hall Translation of the 3rd edition, 2005.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Provision of didactic material in various formats (areas, videos, tutorials, games)

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0219 - Introduction to Web Development

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Introduce Key concepts in the design of Web applications involving programming and database use.

Responsible teacher (s) (s)

2803743 - Dilvan de Abreu Moreira

6346511 - Kamila Rios da Hora Rodrigues

Menu

Integration of servers, databases, languages and scripts for Web programming. Markup languages. Databases more commonly used in Web programming. Programming in languages and frameworks for the web.

Syllabus

History of Web applications development, terminology and problems. Infrastructure used in Web application development: HTTP requests, communications, markup languages (HTML, CSS, etc), client side processing (Javascript, DOM, etc.), server side processing (web frameworks and languages), databases used in Web development (SQL e NoSQL). Development of software examples to help students understand key concepts.

Evaluation instruments and criteria

Evaluation method

Exhibition and exercise resolution classes.

Evaluation criterion

Exercise development and practical work inside and out of class. The final grade will be calculated by the weighted average of the students obtained by the student in the work and tests.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC >= 7.5; or max {np, mrec}, if mrec < 5.0; or 5.0, if 5.0 <= mrec < 7.5. (NP = 1st evaluation, MREC = proof).

Basic bibliography

Texto:

- Nicholas Zakas, Understanding ECMAScript 6: The Definitive Guide for JavaScript Developers 1st. No Starch Press. 2016.
- Responsive Web Design with HTML5 and CSS3, Ben Frain, PACKT

Bibliografia Complementar:

- HTML and CSS: Design and Build Websites, Jon Duckett, Wiley, ISBN-13: 978-1118008188
- Node.js in Practice, Alex R. Young and Marc Harter, Manning, ISBN-13: 978-1617290930

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of web solutions that meet segments of society. Disclosure of online material to other programmers.

Contribution of codes in open repositories.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0240 - Databases

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 01/01/2023 **Deactivation:**

Goals

The goal is provide concepts, techniques, and characteristics of Database Management Systems, allowing the student to develop information systems centered on searching and retrieval of information stored in databases.

Responsible teacher (s) (s)

71532 - Caetano Traina Junior

5357762 - Cristina Dutra de Aguiar

453701 - Elaine Parros Machado de Sousa

2373891 - José Fernando Rodrigues Junior

4812924 - ROBSON LEONARDO FERREIRA CORDEIRO

Menu

Database Management Systems; data modeling via Entity-Relationship model; relational data model; relational algebra; SQL language; transaction processing; normalization.

Syllabus

Introduction to databases and Database Management Systems. Data modeling using the Entity-Relationship Model. Relational Model: concepts, relational algebra and normalization. Introduction to SQL: Data definition and data manipulation commands. Introduction to transaction processing: concepts and theory. Aspects of implementation of database management systems.

Evaluation instruments and criteria

Evaluation method

Expository and Resolution Classes of Exercises/Course Projects.

Evaluation criterion

The final grade will be calculated by the weighted average of the test notes and exercises/course project.

Recovery

If MREC >= 7.5, final grade NP + (MREC/2.5) If 5.0 <= mrec < 7.5, final grade 5.0 If mrec <= 5.0, final note max {np, mrec}
(Np = 1st evaluation, mrec = proof)

Basic bibliography

- Text book:
 - Abraham Silberschatz, Henry F. Korth, S. Sudarshan. Database system. Gen LTC Publishing House, 2020.
 - Ramez Elmasri, Shamkant B. Navathe. Database systems. Publisher Pearson, 2019.
 - Raghu Ramakrishnan, Johannes Gehrke. Database Management Systems. McGraw-Hill Publisher, 2008.
 - C. J. Date. Introduction to Database Systems, Gen LTC Publishing House, 2004.
 - Carlos Alberto Heuser. Database Project. Bookman Publishing House, 2008.
 - Sandra Puga, Edson França, Milton Goya. Database: Implementation in SQL, PL/SQL and Oracle 11g. Publisher Pearson, 2013.
- . Complementary Bibliography:
 - Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom. Database Systems: The Complete Book. Publisher Pearson, 2008.
 - Célio Cardoso. Fundamentals of Database: Modeling, Project and SQL Language. UNICAMP Publisher, 2003.
 - Valdemar W. Setzer and Flávio Soares Corrêa da Silva. Databases: Learn what they are, improve your knowledge, build yours. Edgard Edgard Blücher, 2005.
 - Peter Bailis, Joseph M. Hellerstein, Michael Stonebraker (Editors). Readings in Database Systems. Publisher MIT, 2005. <http://www.redbook.io/>
 - Andreas Meier, Michael Kaufmann. SQL & NOSQL Databases: Models, Languages, Consistency Options and Architecture for Big Data Management. Publisher Springer, 2019.
 - O. Pivert, Nosql Data Models Trends and Challenges, vol. 1. Publisher Wiley, 2018.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SME0104 - Numerical Analysis

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2023 **Deactivation:**

Goals

Introduce students to the main computational techniques in linear algebra and calculus through the study of numerical methods using digital computers.

Responsible teacher (s) (s)

3223814 - Luis Gustavo Nonato

Menu

Machine representation of numbers: floating point numbers and round-off errors. Nonlinear equations: fixed-point iteration, Newton's method and secant method. Numerical solutions of nonlinear systems: fixed-point method and Newton's method. Direct methods for the solutions of linear systems: LU factorization and Gaussian limination. Iterative methods for solving of linear systems: Jacobi-Richardson and Gauss-Seidel methods. Approximation of eigenvalues and eigenvectors: power method, Principal Component Analysis, Singular Value Decomposition and applications. Least-squares approximation. Polynomial interpolation: Lagrange interpolation, Bezier and B-splines, Radial Basis Function Interpolation.

Syllabus

Machine representation of numbers: floating point numbers and round-off errors. Nonlinear equations: fixed-point iteration, Newton's method and secant method. Numerical solutions of nonlinear systems: fixed-point method and Newton's method. Direct methods for the solutions of linear systems: LU factorization and Gaussian limination. Iterative methods for solving of linear systems: Jacobi-Richardson and Gauss-Seidel methods. Approximation of eigenvalues and eigenvectors: power method, Principal Component Analysis, Singular Value Decomposition and applications. Least-squares approximation. Polynomial interpolation: Lagrange interpolation, Bezier and B-splines, Radial Basis Function Interpolation.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work performed in and out of class.

Evaluation criterion

Notes will be assigned to exercises and practical work performed some in class and others out of class. The final grade will be calculated by the weighted average

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests.

Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

$$MF = 5 \text{ se } 5 \leq MR \leq (10 - MS)$$

$$MF = (MS + MR) / 2 \text{ se } MR > (10 - MS)$$

$$MF = MS \text{ se } MR < 5$$

Basic bibliography

Text Book:

- Burden, R. L., Faires, J. D., Análise Numérica, Thompson 2003.
- Franco, N.B. Numerical Calculation, Publisher Pearson Education (2006).

Complementary Bibliography:

- Ruggiero, M.A.G.; LOPES, V.L.R. Numerical Calculation: Theoretical and Computational Aspects, Makron Books, 2nd edition, 1997.
- Humes, A.F.P.C.; MELO, I.S.H. OF; YOSHIDA, L.K.; MARTINS, W.T. Numerical Calculation Notions, McGraw-Hill, 1984
- CUNHA, C. Numerical Methods for Engineering and Applied Sciences, EDUCINAMP, 1993.
- JACQUES,I.; JUDD,C. Numerical Analysis, Chapman and Hall, 1987.
- SCHEID,F. Theory and Problems of Numerical Analysis, McGraw-Hill, 1968.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SME0121 - Stochastic Processes

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 15/07/2023 **Deactivation:**

Goals

Provide to the student solid basis to understand stochastic processes and their applications in Computer Networks and Systems analysis, including methods for Stochastic Simulation.

Responsible teacher (s) (s)

2950182 - Francisco Aparecido Rodrigues

57696 - Marinho Gomes de Andrade Filho

Menu

Introduction. Homogeneous stochastic processes. Poisson Process. Markov chain in discrete and continuous time: definitions, properties, equilibrium distributions. Examples and applications. Birth and Death in discrete and continuous time. Introduction to Queuing Theory. General queues: M/M/c/k. Introduction to stochastic simulation, stochastic analysis of simulation results.

Syllabus

Introduction. Homogeneous stochastic processes. Poisson Process, Markov chain in discrete and continuous time: definitions, properties, equilibrium distributions. Examples and applications. Birth and Death in discrete and continuous time. Introduction to Queuing Theory. General queues: M/M/c/k. Introduction to stochastic simulation, stochastic analysis of simulation results.

Evaluation instruments and criteria

Evaluation method

Theoretical exposure with a view to the objectives of the subject, followed by exercises and practical work inside and outside the class.

Evaluation criterion

Proof Number: At least one test (01) and at most two (02) tests.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests.

Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

MF = 5 se $5 \leq MR \leq (10 - MS)$
MF = $(MS + MR) / 2$ se $MR > (10 - MS)$
MF = MS se $MR < 5$

Basic bibliography

Livro Texto:

ROSS, S. Introduction to Probability Models, 12th Edition. Academic Press, 2019.
Roy D. YATES e David J. GOODMAN. Probabilidade e Processos Estocásticos: Uma Introdução Amigável Para Engenheiros Eletricistas e da Computação 3ª Edição (Português) 2016.

Bibliografia Complementar:

KARLIN, Samuel; TAYLOR, Howard E., An Introduction to Stochastic Modeling, 3th Edition, Academic Press, 1998.
BHAT, Naravan; MILLER, Gregory K. Elements of Applied Stochastic Processes, (Wiley Series in Probability and Statistics), 2002.
CLARKE, A.B.; DISNEY, R.L. Probability and Random Processes, 2nd ed., John Wiley & Sons, 1985.
ÇINLAR, E. Introduction to Stochastic Processes, Prentice-Hall, 1975

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0130 - Software Engineering

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 15 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Provide an overview of the software development process as well as the methods and techniques that can be used during the software development.

Menu

Basic Concepts of Software Engineering. Software Development Process. Methods and Techniques to Analysis and Specification of Requirements. Overview of Software Analysis and Design Phases. Software Project Management. Software Configuration Management. Software Quality. Methods and Techniques for Software Verification and Validation. Software Maintenance.

Syllabus

Introduction and goals of Software Engineering. Software Development Process. Process Models: from linear to interactive and agile. Methods and Techniques to Analysis and Specification of Requirements: characteristics, problems and basic concepts. Overview of Software Analysis and Design Phases. Software Project Management: planning, metrics and estimates. Software Configuration Management. Software Quality: quality process and quality product. Methods and Techniques for Software Verification and Validation: inspection and testing. Software Maintenance.

Evaluation instruments and criteria

Evaluation method

Theoretical exhibition followed by exercises and practical work.

Evaluation criterion

Notes will be attributed to exercises and practical work performed in and out of class, and evidence on program issues.

The final grade will be calculated by the weighted average of these grades obtained by the student during the semester.

Recovery

Approval Criteria: $NP + (MREC/2.5)$, if $MREC > 7.5$; or $\max\{np, mrec\}$, if $mrec \leq 5.0$; or 5.0, if $5.0 \leq mrec < 7.5$. ($np = 1$ st evaluation, $mrec = \text{recovery proof}$)

Basic bibliography

Text Book:

- Larman, Craig - Using UML and standards, 1st edition: 1999 (English), 2000 (Portuguese), 2003 (2. Edition) and 2004 (Portuguese 2. Edition).
- PRESSMAN,R.S. Software Engineering: A Practitioner's Approach, 5 ed., McGraw Hill, 2001.
- SOMMERVILLE, I.; Software Engineering, 5. ed., Addison-Wesley, 1995.
- VON MAYRHAUSER, A.; Software Engineering: Methods and Management, Academic Press, 1990.

Complementary Bibliography:

- Pfleeger, Shari L. "Software Engineering - Theory and Practice", 2nd edition, Makron Books, 2004.
- FOWLER, M.; SCOTT, K.; UML Essencial, Bookman, 2000.
- PRESSMAN,R.S. Engenharia de Software, Makron Books, 2000.
- RUMBAUGH, J.; JACOBSON, I.; BOOCH, G.; The Unified Modeling Language Reference Manual, Addison-Wesley Publishing Company, 1999.
- CONALLEN, J.; Building Web Applications with UML, Addison-Wesley, 1999.
- GHEZZI,C.; JAZAYERI,M.; MANDRIOLI,D. Fundamentals of Software Engineering, Prentice Hall, 1991.
- VON MAYRHAUSER, A. Software engineering: methods and management, Academic Press, 1990.
- FAIRLEY,R.E. Software Engineering Concepts, New York, McGraw-Hill, 1987 (364p).

Extension activities

Social Group target of the activity

Social entities that can benefit from software engineering projects.

Objectives of the activity

Promote interaction between the university and society, with student participation, seeking to solve problems that can involve computational solutions

Activity Description

Application of software engineering techniques seen in the classroom to reports reported in the industry, offering solutions that are documented and available for use by companies or other students as a form of problem -based learning.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0142 - Computer Networks

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Extension workload: 30 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Introduce the basic concepts in computer networks. Exercising the student in technical design, installation and configuration of networks.

Responsible teacher (s) (s)

1842655 - Simone do Rocio Senger de Souza

Menu

Architectures, models, protocols and communication interfaces. Project applications in networks, problems of transport and routing.

Syllabus

1 - Introduction: Structure of networks, characterization, technologies, access and core, packet loss and delay, protocol layers, service models, transmission models, topologies, reference model ISO / OSI and TCP / IP. 2 - Application Layer: client-server model and P2P; application protocols: http, ftp, smtp, etc.; implementation of protocols; 3 - Transport Layer: multiplexing, flow control, congestion control, TCP, UDP, 4 - Network Layer: networks based on virtual circuits and datagrams; IPv4, IPv6, ICMP, routing, addressing (network and subnet), route summarization, congestion control, NAT (Network Address Translation) 5 - Data Link Layer : detecting and correcting errors; Framing; sharing channels; addressing; flow control, ARP 6 - Physical Layer: transmission media analog and digital switching, multiplexing, transmission modes.

Evaluation instruments and criteria

Evaluation method

Theoretical classes followed by application exercises, demonstrations, exercise resolution and laboratory practices.

Evaluation criterion

Weighted average of the test notes and group work.

Recovery

Approval Criteria: $NP + (MREC/2.5)$, if $MREC > 7.5$; or $\max\{NP, MREC\}$, if $MREC \leq 5.0$; or 5.0, if $5.0 \leq MREC < 7.5$. ($NP = 1^{\text{st}}$ evaluation, $MREC = \text{recovery proof}$)

Basic bibliography

Text Book:

- Tanenbaum, Andrew S., Computer Networks, 4th Edition, Campus Publisher, 2003.
- KUROSE, JAMES F., ROSS, KEITH W. Redes de Computadores e a Internet, Addison Wesley Brasil, 2010.

Complementary Bibliography:

- DERSLER, F.J. Guide for interconnection of local networks, Publisher Campos, 1993.
- DERSLER, F.J. Connectivity Guide, Publisher Campos, 1993.
- COMER, D. Internetworking with TCP/IP, V. 1, Prentice Hall, 1992.
- STALLINGS, W. High Speed Networks and Internets: Performance and Quality of Service, Prentice Hall, 2001, 2a edição, ISBN 0130322210.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Provision of didactic material in various formats (areas, videos, tutorials, games)

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0205 - Theory of Computation and Formal Languages

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Give the students the formal notion of algorithm, computability, and decision problem, in order to make them aware of the limitations of computer science. Provide the tools to enable them to better address the solution of problems with the help of computer. Assist students in defining programming languages, ie, its syntax and semantics, through the study of formal grammars.

Responsible teacher (s) (s)

5396589 - Diego Raphael Amancio

5236493 - João Luis Garcia Rosa

3761610 - Thiago Alexandre Salgueiro Pardo

Menu

Regular languages: deterministic and non-deterministic automata, regular expressions; Context-free languages: context-free grammars, push-down automata; Context sensitive languages and recursively enumerable languages: Turing machines, Church-Turing thesis, undecidability:: universal Turing machines.

Syllabus

Regular Languages: deterministic and non-deterministic finite automata, regular expressions, techniques to identify and describe regular languages, techniques to show that a language is not regular, properties of such languages. Context-Free Languages: Context Free Grammars, derivations, derivation trees, ambiguity, push-down automata, properties of such languages, techniques to show that a language is not context-free. Context Sensitive languages and recursively enumerable languages: Turing machines, basic definitions and its relation to the notion of an algorithm/program. Power of Turing Machines and the Church-Turing Thesis. Indecidibilidade: Universal Turing Machines; limitations on our ability to compute; undecidable problems. Complexity Theory: Time Complexity, Space Complexity, intractability.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work inside and out of class. Computer use practice.

Evaluation criterion

Notes will be assigned to practical exercises and work, some in class and others out of class. The final grade will be calculated by the weighted average

Recovery

Realization: Until the first week of later semester classes -Approval Criterium: $NP + (MREC/2.5)$, if $MREC >$ or = 7.5; or max {np, mrec}, if mrec < or = 5.0; or 5.0 < or = mrec < 7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

- Livro Texto:
 - John E. HOPCROFT, Jeffrey D. ULLMA, Rajeev MOTWANI. Introdução à teoria de autômatos, linguagens e computação. Editora Campus, 2003.
 - SIPSER, M. Introdução à teoria da computação. Thomson Learning, 2005.
 - ROSA, J. L. G. Linguagens Formais e Autômatos. Editora LTC, 2010.

Bibliografia Complementar:

- HAREL, D. Algorithmics – The Spirit of Computing. Addison-Wesley, 2. ed., 1992.
- SIPSER, M. Introduction to the Theory of Computation.
- GAREY & JOHNSON Computers and Intractability – a guide to the Theory of NP-Completeness, W.H. Freeman and Company, New York, 1979.
- CORMEN, T.H.; LEISERSON, C.E.; RIVEST, R.L. Introduction to Algorithms. The Mit Press. 1. ed., 1990.
- DIVÉRIO & MENEZES Teoria da Computação – Máquinas Universais e Computabilidade. Série Livros Didáticos 5, IF UFRGS, 2. ed., 2000, Sagra Luzzatto
- MENEZES, P.B. Linguagens Formais e Autômatos, Série Livros Didáticos 3, IF UFRGS, 4. ed., 2001, Sagra Luzzatto
- TOSCANI & VELOSO Complexidade de Algoritmos, Série Livros Didáticos 13, IF UFRGS, 1. ed., 2001, Sagra Luzzatto.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Production of videos available publicly about the history of science (such as Life and Scientific Contributions of Alan Turing, Stephen Cook and Noam Chomsky) and, considering the great relevance of computer science in the world, on issues that may be of interest to society (such as what can and cannot be solved by computer and the types of computational problems that exist). Promotion of open seminars on these subjects.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0207 - Computers and Society I

Class Credits: 2

Work Credits: 0

Total workload: 30 h

Type: Semester

Activation: 01/01/2009 **Deactivation:**

Goals

Raise student awareness of some potential problems posed to individuals and society with the introduction of digital computers. Moreover, students should become aware of their future duties and responsibilities as computing professionals.

Menu

The scope of Ethics in computing, the importance of reasoning in making ethical decisions; Professional Codes of Ethics. The ACM Code of Ethics, the Unified IEEE-CS/ACM Code of Ethics for Software Engineering, a Method for ethical decision making in practical situations. Non-authorized access: what is considered hacking? Types of invasions, hacker's motivations. Intellectual property: the importance of protecting intellectual property; intellectual property and the Codes of Ethics (ACM and Unified IEEE-CS/ACM), authorship rights, patents, business secrecy, reverse engineering, new technologies related with authorship rights. Ethics in the Internet: information freedom, electronic messages, habeas-data and privacy. Internet privacy issues, privacy in telecommunications cryptography. Security critical systems. Denouncement. Professional Illnesses in Computing, Professional Career Management.

Syllabus

The scope of Ethics in computing, the importance of reasoning in making ethical decisions; Professional Codes of Ethics. The ACM Code of Ethics, the Unified IEEE-CS/ACM Code of Ethics for Software Engineering, a Method for ethical decision making in practical situations. Non-authorized access: what is considered hacking? Types of invasions, hacker's motivations. Intellectual property: the importance of protecting intellectual property; intellectual property and the Codes of Ethics (ACM and Unified IEEE-CS/ACM), authorship rights, patents, business secrecy, reverse engineering, new technologies related with authorship rights. Ethics in the Internet: information freedom, electronic messages, habeas-data and privacy. Internet privacy issues, privacy in telecommunications cryptography. Security critical systems. Denouncement. Professional Illnesses in Computing, Professional Career Management.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work, inside and out of class.

Evaluation criterion

Notes will be given to exercises and practical work performed some in class and others out of class. The final grade will be calculated by the average pondered.

Recovery

Realization: Until the first week of later semester classes -Approval Criterium: $NP + (MREC/2.5)$, if $MREC >$ or = 7.5; or max {np, mrec}, if mrec <or = 5.0; or 5.0, if 5.0 <or = mrec <7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

• Livro(s) Texto(s):

- MASIERO, P. C - Computer Ethics, USP Publisher, 2000.

• Complementary bibliography:

-ACM Code of Ethics and Professional Conduct, Communications of the ACM, Vol. 33(5), p. 94-99, 1990.

-JOHNSON, D.G. Computer Ethics, Englewood Cliffs, Prentice Hall, 1985.

-NORAS, S.; MINC, A. The computerization of society, MIT Press, 1978.

-WEIZEBAUM, J. Computer Power and Human Reason, W.H. Freeman, 1976.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0230 - Artificial Intelligence

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Responsible teacher (s) (s)

5890222 - Diego Furtado Silva

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Exhibition in classes, resolution of exercises and practical programming work.

Evaluation criterion

Notes will be assigned to tests and/or practical work. The grade will be calculated by the weighted average of the students obtained by the student during the semester.

Recovery

-Approval Criterium: $NP + (MREC/2.5)$, if $MREC > 0$ or $= 7.5$; or $\max\{NP, MREC\}$, if $MREC < 0$ or $= 5.0$; or $5.0 < MREC < 7.5$. ($NP = 1^{\text{st}}$ evaluation, $MREC = \text{proof}$)

Basic bibliography

Text Book:

-Russel, S.; NORVIG, P. Artificial Intelligence: Modern Approach. Prentice Hall, 2009 (3rd edition).

-G. F. LUGER, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Addison-Wesley, 4th edition, 2008 (6a. edição).

-Faceli, K., Lorena, A. C., Gama, J. and Carvalho, A.: Artificial Intelligence: An Approach to Machine Learning, LTC Publishing House, 2011

-Rosa J. L. G.: Fundamentals of Artificial Intelligence, LTC Publishing House, 2011
-Rezende, S.O. Intelligent Systems: Fundamentals and Applications. 1. Ed., Manole, 2003.

Complementary Bibliography:

- BRATKO, I. Prolog Programming for Artificial Intelligence. 3. ed., Addison-Wesley, 2001.
- RICH, E. Artificial Intelligence. 2.ed. McGraw Hill, 1993.
- NILSSON, NILS J. Artificial Intelligence, SAN FRANCISCO : MORGAN KAUFMANN, 1998. 513 P. IL.
- POOLE, D.; MACKWORTH, A.; GOEBEL, R. Computational Intelligence: a Logical Approach. Oxford University Press, 1998.
- WINSTON,P.H. Artificial Intelligence, Reading. Addison-Wesley, 1977
- BRATKO, I. Prolog Programming for Artificial Intelligence.
- MITCHELL, T. Machine Learning, McGraw-Hill, 1997.
- Rezende, S.O. (ed.) Smart systems. Fundamentals and applications. Manole. 2003.
- Bittencourt, G. Artificial intelligence tools and theories. UFSC. 3rd edition. 2006
- RICH, E.; KNIGHT, K. Inteligência Artificial. McGraw Hill
- G. F. LUGER, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Addison-Wesley, 4th edition, 2002.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of applications aimed at topics of interest to society.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SME0110 - Mathematical Programming

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 01/01/2019 **Deactivation:**

Goals

The aim of this course is to enable students to understand, formulate and solve optimization linear problems with variables continuous and integers.

Responsible teacher (s) (s)

804639 - Frankline Maria Bragion de Toledo

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Expository theoretical classes followed by exercises and practical work (inside and out of class). Theoretical tests. Computer use practice.

Evaluation criterion

Notes will be assigned to practical work, and will be proposed evidence in the classroom. The final grade will be calculated by the weighted average of these notes.

Recovery

Realization: According to the university calendar. Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:
• $mf = 5$ if $5 \leq mr \leq (10 - ms)$
• $mf = (ms + mr) / 2$ if $mr > (10 - ms)$
• $mf = ms$ if $mr < 5$

Basic bibliography

- Text book:

Arenales, M; ARMENTANO, V; Moraita, R.; YANASSE, H. Operational Research - Ed. Campus,

2007.

Complementary bibliography

- BAZARAA, M. JARVIS, J.J., SHERALI, H. D., LINEAR PROGRAMMING AND NETWORK FLOWS, WILEY-INTERSCIENCE, 3A. Edition, 2005.
Bertsimas, D. and Tsitsiklis, J.N. - Introduction to linear optimization, Athena Scientific, 1997.
CONFORT, M., Cornéjols, G. Zambelli, G. Integer Programming, Springer, 2014.
WOLSEY, L. A. Integer Programming, Wiley, 1998.
WINSTON, W.L. -Operations Research-Applications and Algorithms-Ie-Thomson, 4th edition, 2004.
Goldbarg, M.C. and Luna, H.P.L - Combinatorial Optimization and Linear Programming - Models and Algorithms - Editora Campus, 2nd Edition - 2005 ..
HILLIER, F.S.; LIEBERMAN, G.J.- Introduction to Operational Research, Rio de Janeiro, RJ, Campus, 1988.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0903 - High Performance Computing

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Type: Semester

Activation: 01/01/2019 **Deactivation:**

Goals

To teach concepts about high performance computing, approaching its hardware and software main concepts, and focusing on the development of parallel applications.

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Introduction to parallel computing; Parallel hardware usually applied for high performance computing; Development of parallel applications; Performance evaluation of high performance computing systems; Testing of parallel programs.

Syllabus

Introduction to parallel computing: context and basic concepts; Parallel hardware for high performance computing: parallel architectures, hardware organizations affecting performance (processors, memories and interconnecting networks). Software design for high performance computing: programming models for the development of parallel applications, tools for the development of parallel applications (compilers, libraries and standards), scheduling of processes. Development of parallel applications: case studies. Performance evaluation of high performance computing systems: metrics and methodologies. Testing of parallel programs: concepts, techniques and tools.

Evaluation instruments and criteria

Evaluation method

Exhibition of the contents. Exercise development and practical work during classes and extra-class.

Evaluation criterion

Notes will be assigned to exercises and practical work developed during the course, as well as the evaluations (tests) applied during the semester. The final grade will represent the weighted average of the students obtained by the student during the semester.

Recovery

For recovery approval (final grade <5), this criterion should be used: $(np-2) / 5 * mrec + 7-np$, if $mrec \geq 5$; or $\max\{np, mrec\}$, if $mrec < 5$

Basic bibliography

Livro Texto

RAUBER, T.; RÜNGER, G. Parallel programming: for multicore and cluster systems. Springer, 2010. ISBN-10: 364204817X ou ISBN-13: 978-3642048173.
PACHECO, P.S. An introduction to parallel programming. Morgan Kaufmann. Elsevier Science, 2011. ISBN: 978-0-12-374260-5

Bibliografia Complementar

GRAMA,A.; KUMAR, U.; GUPTA,A.; KARYPIS, G. Introduction to Parallel Computing, 2nd Edition, 2003, ISBN: 0201648652. QUINN, M.J. Parallel Programming in C with MPI and OpenMP, McGraw-Hill, Published 2003, ISBN: 0072822562.
QUINN, M.J. Parallel Programming in C with MPI and OpenMP, McGraw-Hill, Published 2003, ISBN 0072822562.
FOSTER, I. Designing and Building Parallel Programs, Addison-Wesley Publishing Company, 1994.
STALLINGS, W. Arquitetura e Organização de Computadores: projeto para o desempenho, 5^a ed., Prentice-Hall, Inc., São Paulo, 2002.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0217 - Programming Language and Compilers

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 01/01/2017 **Deactivation:**

Goals

To present the students theory and techniques of compiler construction.

Menu

Basic concepts of programming languages. Introduction to Compiling and to the phases of compilation: Lexical analysis, Top-down and bottom-up parsing techniques. Semantic analysis and table symbols. Code generation. Implementation of a compiler for a simple imperative language.

Syllabus

Introduction to Programming languages - languages evolution, paradigms, programming methods, data types. Basic Concepts of compilation: compilers and related programs (interpreters, pre-processing tools, loaders, etc.), one-pass and multi-pass compilers, types of compilation (bootstrapping, cross-compiling, etc.) and compiler compilers. Lexical analysis and techniques for implementing scanners based on finite automata, compiler compilers and ad hoc. Syntactic analysis: top-down and bottom-up and implementation of Predictive Parsers using manual techniques and automatic generators. Semantic analysis and table symbols. Lexical, Syntactical and Semantic error recovery and notification. Concepts of intermediary code generation and optimization. Object code generation. Definition of a simple imperative language and implementation of a compiler for a hypothetical machine.

Evaluation instruments and criteria

Evaluation method

Expository classes, project guidance, tests.

Evaluation criterion

Project and tests.

Recovery

Approval Criteria: $NP + (MREC/2.5)$, if $MREC \geq 7.5$; or $\max\{NP, MREC\}$, if $MREC < 5.0$; or 5.0, if $5.0 \leq MREC < 7.5$. ($NP = 1st$ evaluation, $MREC = proof$)

Basic bibliography

Basic Bibliography:

- AHO, A.V.; SETHI, R. and ULLMAN, J.D. *Compilers, Principles, Techniques, and Tools*, Addison-Wesley Pub. Company, 1986.
- Louden, Kenneth C - *Compilers: Principles and Practices*, Thomson Learning Publisher. 2004.
- AHO, A.V.; ULLMAN, J.D. *Principles of Compiler Design*, Reading, Addison-Wesley Pub. Company, 1977.
- SEBESTA, R. W. *Concepts of Programming Languages*. Addison-Wesley. 2010.

Complementary Bibliography:

- Kowaltowsky, T. *Implementation of programming languages*, São Paulo, Guanabara Two, 1983.
- NETO, José J. *Introduction to compilation*, Rio de Janeiro, Scientific Technical Books, 1987.
- Setzer, Valdemar W.; MELO, Inês S.H. *of the construction of a compiler*, Publisher Campus, 1983.
- WIRTH, N. *Algorithms and Data Structures*, Englewood Cliffs; Prentice-Hall, 1986.
- Paulo Fernando Blauth Menezes, *formal languages and automata*, series books series. UFRGS Institute of Informatics. (3 edition). ISBN 85-241-0554-2.
- Price, A.M.A and Toscani, S.S. *Implementation of programming languages, compiler*, Publisher Sagra Luzatto. 2001.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0250 - Computer Graphics

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Type: Semester

Activation: 01/01/2023 **Deactivation:**

Goals

Provide students introductory knowledge about computer graphics as well as practice of basics concepts and applications

Responsible teacher (s) (s)

793065 - John of the Holy Spirit Batista Neto

88433 - Maria Cristina Ferreira de Oliveira

6116132 - Moacir Antonelli Ponti

5373016 - RICARDO MARCONDES MARCACINI

Menu

Origin and goals of computer graphics. Raster versus vector devices. Input and output devices. Graphical systems and equipments. Raster conversion algorithms and graphical primitive filling. 2D or 3D geometry transformations: homogeneous coordinates and transformation matrices. Change of 2D and 3D coordinate systems. Clipping techniques. Parallel and perspective projection transformations. Virtual camera. Concepts of geometric modeling. Polyhedral models and polygon meshes. Rendering process: light sources; lighting and shading models: flat, Gouraud and Phong. Surface and line removal. Texture mapping. Antialiasing techniques.

Syllabus

Origin and goals of computer graphics. Raster versus vector devices. Input and output devices. Graphical systems and equipments. Raster conversion algorithms and graphical primitive filling. 2D or 3D geometry transformations: homogeneous coordinates and transformation matrices. Change of 2D and 3D coordinate systems. Clipping techniques. Parallel and perspective projection transformations. Virtual camera. Concepts of geometric modeling. Polyhedral models and polygon meshes. Rendering process: light sources; lighting and shading models: flat, Gouraud and Phong. Surface and line removal. Texture mapping. Antialiasing techniques.

Evaluation instruments and criteria

Evaluation method

Theoretical and practical classes in the laboratory. Exercises and discussions about the program themes.

Evaluation criterion

Weighted average of the grades in tests, works and projects, obtained by the student during the course.

Recovery

Realization: Until the first week of later semester classes -Approval Criterium: $NP + (MREC/2.5)$, if $MREC >$ or = 7.5; or max {np, mrec}, if mrec <or = 5.0; or 5.0, if 5.0 <or = mrec <7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

Livro Texto:

- Shirley, P. Ashikhmin, Michael. Fundamentals of computer graphics. 2nd ed. Wellesley, Mass, AK Peters, 2005, 623 p.
- Angel, Edward. Shreiner, Dave. Interactive computer graphics: a top-down approach with shader-based OpenGL. 6th ed. Boston, Addison-Wesley, 2012.
- Hearn, Donald. Carithers, Warren R.. Baker, M. Pauline. Computer graphics with OpenGL. 4th ed. Boston, Addison Wesley, 2011.

Bibliografia Complementar:

- Guha, Sumanta. Computer graphics through OpenGL: from theory to experiments. Third edition. Boca Raton, Taylor & Francis, 2019.
- Brothaler, Kevin. OpenGL ES 2 for android : a quick-star guide. Dallas, Pragmatic Bookshelf, 2013.
- Wright Jr., Richard S.. Haemel, Nicholas. Sellers, Graham. Lipchak, Benjamin. OpenGL superbible : comprehensive tutorial and reference. 5. ed. Upper Saddle River, Addison-Wesley, 2011.
- Rost, Randi J. Licea-Kane, Bill. OpenGL shading language. 3rd ed. Upper Saddle River, NJ, Addison Wesley, 2010. OpenGL series.
- Azevedo, Eduardo. Conci, Aura. Computação gráfica : teoria e prática. Rio de Janeiro, Elsevier, 2003. 353 p.
- Watt, Alan H.. 3D computer graphics. 3rd ed. Harlow, England, Addison-Wesley, 2000.
- Foley, James D. Computer graphics : principles and practice. 2nd ed in C. Reading, Mass., Addison-Wesley, 1997.
- Hearn, Donald. Baker, M Pauline. Computer graphics. 2. ed. London, Prentice-Hall International, 1994.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0120 - Information Systems

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 15/07/2020 **Deactivation:**

Goals

Introducing the fundamental concepts of Information Systems, as well as the current trends of Information Technologies and Information Systems in the context of organizations. Providing the student with an understanding of the relationship between the technical components of an Information System with the structure, function and politics of an organization.

Menu

Organizational underpinnings of Information Systems (IS). Case studies of IS in contemporary organizations. Professional careers in IS. Business Processes. Types of IS according to the organizational levels and functions. Introduction to integrated enterprise applications. The strategic role of IS in organizations. Fundamentals of organization theory. Organizational Implications of IS. Ethical and social issues related to IS in organizations. IT infrastructure management. Decision making and decision support systems.

Syllabus

Organizational underpinnings of Information Systems: perspectives and dimensions of IS, system theory applied to IS, contemporary approaches to IS, IS as socio-technical systems. Case studies of IS in contemporary organizations. Professional careers in IS: characteristics of the professional field of IS/IT, the IS function in organizations. Business Processes and Business Process Management. Types of IS according to the organizational levels and functions. Transaction Processing Systems, Management Information Systems, Decision Support Systems e Executive Information Systems. Introduction to integrated enterprise applications: ERP, CRM, SCM, KMS, BI, collaborative systems. The strategic role of IS in organizations. Fundamentals of organization theory: main characteristics and perspectives on organizations. Organizational Implications of IS. Ethical and social issues related to IS in organizations. IT Management: IT infrastructure, IT Service Management and contemporary technological trends. Decision making and decision support systems

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work, inside and out of class. Intensive case use to illustrate the methods presented.

Evaluation criterion

Notes will be assigned to exercises and practical work performed some in class and others out of class. The final grade will be calculated by the weighted average of these various grades obtained by the student throughout the semester.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC> = 5; or max {np, mrec}, if mrec <5

Basic bibliography

Text Book:

-Laudon, K. C., Laudon, J. P., Management Information Systems, Prentice Hall, 7th Edition, 2009;
5th edition, 2004; MANAGEMENT SYSTEMS: 2002, 2004 and 2009.

Complementary Bibliography:

-R.Kelly Rainer Jr e Efraim Turban, Introduction to Information Systems, 2nd. ed. John Wiley, 2009.
-LUCAS JR, H.C. - Information Technology for Management, McGraw-Hill, 1997.
-WARD, J., PEPPARD, J.; Strategic Planning for Information Systems. John Wiley & Sons, Inc., 3rd edition. 2002.
-LAUDON, K. C., LAUDON, J. P.; Essentials of Management Information System - Organization and Technology in the Networked Enterprise. Prentice-Hall, 4^a Edição, 2001.
-LAUDON, K.C.; LAUDON J.P. - Management Information System Organization and Technology, Prentice-Hall, 1996.
-O'Brien, J. A; Information Systems and Management Decisions on the Age on the Internet. 9th edition translation. Saraiva Publisher. 2001.
-Sstair, R.M. - Principles of Information Systems - An Approach Management, LTC, 1998.
-OZ, E. - Management Information Systems, International Thomson Publishing Company-ITP, 1998.

Additional information on the current class schedule (in Portuguese)

Course: SSC0900 - Security Engineering

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Extension workload: 15 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Familiarize the student with basic computer security concepts and cryptographic algorithms. Practical aspects should be addressed.

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

2529921 - Kalinka Regina Lucas Jaquie Castelo Branco

Menu

Concepts, encryption, authentication, access control, database security, malicious software, denial of service attack, intrusion, firewalls, software security, and operating systems. Case studies.

Syllabus

Concepts: threats, attacks, and resources; principles and strategies; ethical hacking. Cryptography: symmetric coding for confidentiality; message authentication; coding with asymmetric keys; steganography. Authentication: user authentication principles; keywords, tokens, biometrics; remote authentication. Access control: users, objects, and access rights; set of access rights (roles); control based on access attributes; identity, credential, and access control. Security in databases: SQL attacks (injection); access control; encryption in databases; inference on data; security in cloud computing. Malicious software: types; persistent threats; viruses, worms, spam, trojan, keyloggers, phishing, spyware, backdoors, among others; counterattack. Attack for denial of service: flooding, distributed attacks, defense and response mechanisms. Firewalls: characteristics and access policies; types; configuration. Internet governance: definitions and clarifications on internet governance. Case studies carried out in practical classes.

Evaluation instruments and criteria

Evaluation method

Evidence related to the concepts treated in the classes. Practical work done inside and outside the laboratory.

Evaluation criterion

Weighted average (NP) of evidence and works.

Recovery

Recovery Proof (MREC). Criterion: $NP + (MREC/2.5)$, if $MREC >= 7.5$; or $\max\{np, mrec\}$, if $mrec <= 5.0$; or $5.0 <= mrec < 7.5$ ($np = 1$ st evaluation, MREC = recovery test).

Basic bibliography

Bibliografia:

Livro Texto:

STALLINGS, W. Criptografia e Segurança de Redes, 4a. edição - Prentice Hall.

Bibliografia Complementar:

STALLINGS, W; BROWN, L. Computer Security: Principles and Practice. 3a. Ed.:Pearson, 2016.

ANDERSON, R. Security Engineering, 2nd Edition, Willey.

GURGEL, P., BRANCO, K. BRANCO, L., BARBOSA, E., TEIXEIRA, M. Redes de Computadores - Da teoria à prática com Netkit - 1a. edição Campus Elsevier, 2014.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Provision of didactic material in various formats (areas, videos, tutorials, games)

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in proposed activities. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0904 - Distributed Computing Systems

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 01/01/2019 **Deactivation:**

Goals

To introduce the fundamentals of distributed computing systems and their implementation techniques. Apply the fundamentals and techniques of distributed computer systems in case studies.

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Historical evolution and introduction to basic concepts; Architectural models; Communication and coordination models; Distributed application projects; Case studies.

Syllabus

Historical evolution and introduction to basic concepts; Architectural models: client-server, peer-to-peer, ad-hoc and others; Communication and coordination models: shared and distributed memory; Distributed applications projects: methodologies of design and development of distributed applications. Definition and characteristics of the components of a distributed system: front-ends, back-ends, brokers. Use of distributed databases as support for distributed applications; Platforms for the development of distributed applications; Case studies such as: distributed file systems, distributed application servers, use of large volumes of open data collected from government servers, problems related to communication and synchronization of distributed applications.

Evaluation instruments and criteria

Evaluation method

Exhibition of the contents. Exercise development and practical work during classes and extra-class.

Evaluation criterion

Notes will be assigned to exercises and practical work developed during the course, as well as the evaluations (tests) applied during the semester. The final grade will represent the weighted average of the students obtained by the student during the semester.

Recovery

For recovery approval (final grade <5), this criterion should be used: $(np-2) / 5 * mrec + 7-np$, if $mrec \geq 5$; or $\max\{np, mrec\}$, if $mrec < 5$

Basic bibliography

Livro Texto:

COULOURIS, G.; DOLLIMORE, J.; KINDBERG, T. Gordon B. Distributed Systems: Concepts and Design, Addison-Wesley, Hardcover, 5th edition, Published May 2013, 1067 pages, ISBN 0132143011

Bibliografia Complementar:

TANEMBAUM, A. S. Distributed Systems: Principles and Paradigms (2nd Edition), Prentice Hall, 2006, 704 pages.

GHOSH, S. "Distributed Systems: An Algorithmic Approach, Second Edition", 2014, ISBN: 1466552972, 552 pages PIERSON, J. M. "Large-Scale Distributed Systems and Energy Efficiency: A Holistic View", 2015, ISBN: 1118864638, 336 pages.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0291 - Supervised Professional Practice I

Class Credits: 4

Work Credits: 10

Total workload: 360 h (Internship: 300 h)

Type: Semester

Activation: 15/07/2020

Deactivation:

Goals

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Meetings with the person responsible for the discipline to report the progress of the internship, advice, indication of bibliographic references and writing of monographs.

Evaluation criterion

A detailed monograph will be elaborated on the internship. The final grade will be decided on the basis of the evaluation of this monograph and a presentation of the work developed by a bank made up of two teachers, one of which is responsible for the discipline.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC or = 7.5; or max {np, mrec}, if mrec or = 5.0; or 5.0, if 5.0 or = mrec 7.5. (NP = 1st evaluation, mrec = proof)

Basic bibliography

Books, manuals and articles linked to the area where the internship will be developed.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0292 - Supervised Professional Practice II

Class Credits: 4

Work Credits: 10

Total workload: 360 h (Internship: 300 h)

Type: Semester

Activation: 15/07/2020

Deactivation:

Goals

Responsible teacher (s) (s)

2162972 - Rudinei Goularte

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Meetings with the person responsible for the discipline to report the progress of the internship, advice, indication of bibliographic references and writing of monographs.

Evaluation criterion

A detailed monograph will be elaborated on the internship. The final grade will be decided on the basis of the evaluation of this monograph and a presentation of the work developed by a bank made up of two teachers, one of which is responsible for the discipline.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC or = 7.5; or max {np, mrec}, if mrec or = 5.0; or 5.0, if 5.0 or = mrec 7.5. (NP = 1st evaluation, mrec = proof)

Basic bibliography

Books, manuals and articles linked to the area where the internship will be developed.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0220 - Laboratory of Introduction to Computer Science II

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2013 **Deactivation:**

Goals

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Exhibition and exercise resolution classes.

Evaluation criterion

Recovery

Given the characteristics of the disciplines, no recovery will be offered.

Basic bibliography

TEXT BOOKS:

CORMEN, T.H.; LESERSON, C.E.; RIVEST, R.L.; STEIN, C. Algorithms: Theory and Practice. Campus Editor, 2002.

ZIVIANI, N. Algorithms Project. 2nd edition, Thomson, 2004.

TENENBAUM, A.M., e outros. Data Structures Using C. Prentice-Hall, 1990.

Complementary Bibliography:

GRIES, D. The Science of Programming. Berlin, Springer, 1981.

SCHILD, H. "C. Completo e Total". Makronbooks, 1997.

KERNIGHAM, B.W.; RITCHE, D.M.C. The standard ASI programming language. Campus Publisher, 1995.

KELLEY, A.; PHL, I. A Book on C. 2º Edição, The Benjamin/Cummings Pub. Co., Inc, 1990.

ROBERTS, E. Programming Abstraction in C. Addison Wesley, 1996.

SEGEWICK, R. Algorithms in C. Addison-Wesley, 1990.

SHOOMAN, M. L. Software Engineering. New York, McGraw-Hill, 1983.

SZWARCFITER, J. L.; MARKENZON, L. Data structures and their algorithms. Technical and Scientific Books, 1994.

KELLEY, A.; PHOL, I. A Book on C. 2º Edição, The Benjamin/Cummings Pub. Co., Inc. 1990.
WIRTH, N. Algortmos + Data Structures = Programs. Prentice-Hall, 1986.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0303 - Introduction to Data Compression

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Provide students with necessary skills to understand and to develop data compression techniques applied to different data types and contexts in a practical.

Responsible teacher (s) (s)

2162972 - Rudinei Goularte

Menu

Data compression definitions. Introduction to Information Theory. Lossless compression. Lossy compression. Applying compression techniques to different types of media (text, sound, image and video).

Syllabus

Definitions (data, compression, compression rate and redundancy). Concepts of Information Theory: information, quantifying information, and data entropy. Data compressor and decompressor. Differential encoding. Run-length encoding. Statistical methods, variable code length, prefix code. Dictionary methods. Transform methods. Compression standards.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work, inside and out of class.

Evaluation criterion

Notes will be attributed to practical work developed inside and outside the classroom. The final grade will be calculated as a weighted average of the grades obtained by the students during the semester.

Recovery

-Approval Criterium: $NP + (MREC/2.5)$, if $MREC > 7.5$; or $\max\{NP, MREC\}$, if $MREC < 7.5$; or 5.0, if $5.0 \leq MREC \leq 7.5$. ($NP = 1^{\text{st}}$ evaluation, $MREC = \text{proof}$).

Basic bibliography

Salomon, D. - Data Compression The Complete Reference, 3rd edition, Springer, 2004.
LANGSAM, Y. Et al - Data Structures using C And C++, 2nd edition, Prentice-Hall, 1996.
GONZALES, RAFAEL C.; Woods, Richard E. - Processamento Digital de Imagens, 3a edição, Pearson, 2010.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0119 - Practice in Computer Organization

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 01/01/2014 **Deactivation:**

Goals

Develop practical projects in the laboratory in the field of basic processor architecture, microprocessors and assembly language.

Menu

Practical classes on CPU design and implementation, including the arithmetic logic unit, registers, counters, memory, and the control unit and its programming in assembly language.

Syllabus

Practical classes on CPU design and implementation using hardware description language, including a control unit using finite state machines, and other basic components, such as the arithmetic logic unit and register bank. The development of software in assembly language will be covered as well, including macro and micro instructions, system bus and data input/output.

Evaluation instruments and criteria

Evaluation method

Projects and practices in laboratories

Evaluation criterion

Weighted average of the students obtained by the student in laboratory activities.

Recovery

Approval Criteria: $NP + (MREC/2.5)$, if $MREC > 7.5$; or $\max\{np, mrec\}$, if $mrec \leq 5.0$;
or 5.0, if $5.0 \leq mrec < 7.5$. ($NP = 1st$ evaluation, $MREC = recovery$ test).

Basic bibliography

Text:

- STALLINGS, W. Computer Organization and Architecture: Designing for Performance. Prentice Hall, 2005, 7th edition, ISBN 0131856448.
- PATTERSON, D. A.; et al Computer Organization and Design. 3rd Edition, Morgan Kaufmann, 2004, BK&C Edition, ISBN 1558606041.

Complementary Bibliography:

- MANO, M.M.; KIME, C.R. Logic and Computer Design Fundamentals. Prentice Hall, 2000.
- WAKERLY, J.F. Digital Design: Principles & Practices. Third Edition, Prentice Hall, 2000.
- TANENBAUM, A.S. Structured Computer Organization. Prentice Hall, 5a edição, 2005, ISBN 0131485210.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0213 - Scientific Methodology for Computer Science Research

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

To introduce the students to the basic elements of the scientific research, providing the necessary tools for the development of academic projects in the Computer Science area.

Responsible teacher (s) (s)

6116132 - Moacir Antonelli Ponti

Menu

Academic Research Project. Overview of research on Computer Science. Scientific writing: techniques and tools. Statistical data analysis experimentation.

Syllabus

Academic research project: structure, choice of topics/thesis, objectives, problem formulation, construction of hypotheses, research classification. Overview of research on Computer Science. Scientific writing: techniques and tools. Systematic research review. Statistical data analysis experimentation: hypotheses test, correlation and regression, assessment of classification quality (precision/recall and ROC curves). Use of tools such as R and Pandas (python). Descriptive statistics and Graphical visualization.

Evaluation instruments and criteria

Evaluation method

Exhibition classes and seminars. Reports should be developed on the work developed by students

Evaluation criterion

Participation in classes. Practical and/or theoretical work. Preparation of reports and seminars. The final grade will be calculated by the weighted average of the grades obtained by the student during the semester

Recovery

-Approval Criterium: $NP + (MREC/2.5)$, if $MREC > 0$ or = 7.5; or $\max\{np, mrec\}$, if $mrec < 0$ or = 5.0; or 5.0, if 5.0 < $mrec < 7.5$. ($np = 1$ st evaluation, $mrec = proof$)

Basic bibliography

Text Book:

WAZLAWICK, R.S. Research Methodology for Computer Science, 3rd edition, 2020, LTC.

Complementary Bibliography:

WAINER, J. (2007). Quantitative and qualitative research methods for computing science.

In T. Kowaltowski and K.

Breitman (org.), Available for download at: <http://www.ic.unicamp.br/~wainer/publications.html>.

-Andrade, M.M. "Introduction to the methodology of scientific work". 7th ed. São Paulo: Atlas, 2005.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Dissemination of content related to the scientific method, role of science and advancement potentials.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0227 - Seminars in Computing I

Class Credits: 1

Work Credits: 0

Total workload: 15 h

Type: Semester

Activation: 01/01/2011 **Deactivation:**

Goals

The main goal of this course is to encourage students to participate of extracurricular activities, since they are important to completely prepare them for the chosen career and also to give them knowledge of different research areas of computer science.

Menu

Seminars and tutorials of different topics of computer science.

Syllabus

Presentation of seminars and tutorials of different topics of computer science.

Evaluation instruments and criteria

Evaluation method

Exposure of seminars and tutorials

Evaluation criterion

Notes will be assigned to the reports and the student will be evaluated by their participation in the seminars. The final grade will be calculated by the weighted average of these notes.

Recovery

-Approval Criterium: NP+(MREC/2.5), if MREC > or = 7.5; or max {np, mrec}, if mrec < or = 5.0; or 5.0 < or = mrec < 7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

Books, manuals and articles related to the selected topic.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0295 - Academic Extension Activities I

Class Credits: 1

Work Credits: 2

Total workload: 75 h

Extension workload: 75 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Responsible teacher (s) (s)

5055859 - Marcelo Garcia Manzato

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Students should register the activities in a specific form, attach copy of supporting documents (such as certificates and event programs) and forward them to the responsible teacher to analyze and evaluate the credits to be attributed to the activities developed.

Evaluation criterion

Students must present the activities developed for the class and the accounting of the credits will be defined by the responsible teacher. The grade will be awarded by the teacher according to the quality of the work done and presented. Activities will be accounted for once, for the purpose of credits.

Recovery

Presentation of additional supporting documents that are requested.

Basic bibliography

To be recommended by the responsible teacher, when relevant.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

1. Organization and/or promotion of diffusion, update and others courses; 2. Events: organization and/or promotion of congresses, seminars, round tables, academic weeks, symposiums, meetings, journeys, lectures, conferences; 3. Free software development; 4. Development of projects that can benefit the external community; 5. Other regulated activities, at the discretion of the responsible teacher.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0210 - Advanced Algorithms Laboratory I

Class Credits: 3

Work Credits: 2

Total workload: 105 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Resolution of exercises aiming to review/improve rapid development of advanced algorithms skills. The goal is to develop group work, and to learn the International Collegiate Programming Contest format and dynamics.

Responsible teacher (s) (s)

793065 - John of the Holy Spirit Batista Neto

2084609 - Maria da Graça Campos Pimentel

Menu

Advanced algorithms including: data structures; trees and graphs; string processing; arithmetic and algebra, combinatorial analysis; number theory; sorting.

Syllabus

Advanced algorithms with emphasis in algorithm design paradigms and problem solving treatment: data structures; trees and graphs; string processing; arithmetic and algebra; combinatorial analysis; number theory; sorting; greedy algorithms.

Evaluation instruments and criteria

Evaluation method

Theoretical classes, followed by exercises and practical work inside and outside the class. Practical classes using microcomputer simulations.

Evaluation criterion

Notes will be assigned to tests and/or practical work. The final grade will be calculated by the weighted average of the grades obtained by the student during the semester.

Recovery

-Approval Criterium: NP+(MREC/2.5), if MREC or = 7.5; or max {np, mrec}, if mrec or = 5.0; or 5.0, if 5.0 or = mrec 7.5.
(NP = 1st evaluation, mrec = proof)

Basic bibliography

"Text book:

- CORMEN, T.H. et al Introduction to Algorithms, Mit Press, Second Edition, 2001.
- SKIENA, S.S.; REVILLA, M.A. Programming Challenges - The programming contest training manual. Springer, 2003.

"Complementary Bibliography:

- Steven S. Skiena e Steve Skiena: The Algorithm Design Manual, Springer Verlag, 1997.
- Thomas H. Cormen (editor), Charles E. Leiserson e Ronald L. Rivest: Introduction to Algorithms, MIT Press, Segunda Edição, 2001.
- Dan Gusfield: Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, Cambridge University Press, 1997.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Disclosure of content on the web about advanced algorithms seen in the room.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0228 - Seminars in Computing II

Class Credits: 1

Work Credits: 0

Total workload: 15 h

Type: Semester

Activation: 01/01/2011 **Deactivation:**

Goals

The main goal of this course is to encourage students to participate of extracurricular activities, since they are important to completely prepare them for the chosen career and also to give them knowledge of different research areas of computer science.

Menu

Seminars and tutorials of different topics of computer science.

Syllabus

Presentation of seminars and tutorials of different topics of computer science.

Evaluation instruments and criteria

Evaluation method

Exposure of seminars and tutorials

Evaluation criterion

Notes will be assigned to the reports and the student will be evaluated by their participation in the seminars. The final grade will be calculated by the weighted average of these notes.

Recovery

-Approval Criterium: $NP + (MREC/2.5)$, if $MREC \geq 7.5$; or $\max\{NP, MREC\}$, if $MREC < 7.5$.
(NP = 1st evaluation, mrec = proof)

Basic bibliography

Books, manuals and articles related to the selected topic.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0296 - Academic Extension Activities II

Class Credits: 1

Work Credits: 2

Total workload: 75 h

Extension workload: 75 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Responsible teacher (s) (s)

5055859 - Marcelo Garcia Manzato

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Students should register the activities in a specific form, attach copy of supporting documents (such as certificates and event programs) and forward them to the responsible teacher to analyze and evaluate the credits to be attributed to the activities developed.

Evaluation criterion

Students must present the activities developed for the class and the accounting of the credits will be defined by the responsible teacher. The grade will be awarded by the teacher according to the quality of the work done and presented. Activities will be accounted for once, for the purpose of credits.

Recovery

Presentation of additional supporting documents that are requested.

Basic bibliography

To be recommended by the responsible teacher, when relevant.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

1. Organization and/or promotion of diffusion, update and others courses; 2. Events: organization and/or promotion of congresses, seminars, round tables, academic weeks, symposiums, meetings, journeys, lectures, conferences; 3. Free software development; 4. Development of projects that can benefit the external community; 5. Other regulated activities, at the discretion of the responsible teacher.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0953 - Open Source Systems

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Type: Semester

Activation: 01/01/2019 **Deactivation:**

Goals

Introduce the student to the foundations of Open Source paradigm, develop competences to work in design, implementation and deployment of open computer systems, including aspects of technical, methodological, legal, managerial and strategic nature present in real-world challenges.

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Introduction to the Open Source paradigm, resources and implementation tools, project management, notions on intellectual property, technology licensing, product strategy, entrepreneurship with Open Source and business models.

Syllabus

Conceptual foundations: introduction to the Open Source paradigm, historical evolution, state of art and case studies.

Technologies and methodologies: open and distributed development tools and resources, version control systems (eg Git), project and building automation (eg make, autotools), release and distribution policies. Project management: requirements for open collaborative development, formation of development communities, contributions management, human factors. Legal aspects: essential notions on intellectual property, author rights, technology licensing, ethical, legal and economical requirements and implications in the selection of distribution licenses. Business models: Open Source as innovation strategy, financial and business models, commercial projects and entrepreneurship.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work.

Evaluation criterion

Notes will be assigned to exercises and practical work performed inside and out of class about the topics addressed by the program. The final grade will be calculated by the weighted average of these grades obtained by the student during the semester.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC >= 5; or max {np, mrec}, if mrec < 5

Basic bibliography

Livros Texto:

Steinmacher, Igor Fábio. Supporting newcomers to overcome the barriers to contribute to open source software projects. 2015. Tese de Doutorado. Universidade de São Paulo.

Bibliografia Complementar:

Sandred, Jan. Managing open source projects: A Wiley tech brief. Vol. 18. John Wiley & Sons, 2002.013.

Raymond, Eric. "The cathedral and the bazaar." Knowledge, Technology & Policy 12.3 (1999): 23-49.

Stallman, Richard. Free software, free society: Selected essays of Richard M. Stallman. Lulu. com, 2002.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0211 - Advanced Algorithms Laboratory II

Class Credits: 3

Work Credits: 2

Total workload: 105 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Implement laboratory programming techniques presented in Advanced Algorithms for the consolidation of theory presented in class.

Responsible teacher (s) (s)

793065 - John of the Holy Spirit Batista Neto

2084609 - Maria da Graça Campos Pimentel

Menu

Backtracking, divide-and-conquer, dynamic programming, control flow graph, strings (matching), geometry and computational geometry.

Syllabus

Emphasis is placed on fundamental algorithms and advanced methods of algorithmic design, analysis, and implementation. Techniques to be covered include backtracking, divide-and-conquer, dynamic programming, control flow graph, strings (matching), geometry and computational geometry.

Evaluation instruments and criteria

Evaluation method

Theoretical classes, followed by application exercises, demonstrations, exercise resolution and laboratory practices.

Evaluation criterion

Average notes in practical computer exercises (laboratory) and final test.

Recovery

-Approval Criterium: NP+(MREC/2.5), if MREC or = 7.5; or max {np, mrec}, if mrec or = 5.0; or 5.0, if 5.0 or = mrec 7.5.
(NP = 1st evaluation, mrec = proof)

Basic bibliography

"Text book:

- Thomas H. Cormen (editor), Charles E. Leiserson e Ronald L. Rivest: Introduction to Algorithms, MIT Press, Segunda Edição, 2001.
- SKIENA, S.S. e REVILLA, M.A. (2003) Programming Challenges The programming contest training manual. Springer.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Disclosure of content on the web about advanced algorithms seen in the room.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0229 - Seminars in Computing III

Class Credits: 1

Work Credits: 0

Total workload: 15 h

Type: Semester

Activation: 01/01/2011 **Deactivation:**

Goals

The main goal of this course is to encourage students to participate of extracurricular activities, since they are important to completely prepare them for the chosen career and also to give them knowledge of different research areas of computer science.

Menu

Seminars and tutorials of different topics of computer science.

Syllabus

Presentation of seminars and tutorials of different topics of computer science.

Evaluation instruments and criteria

Evaluation method

Exposure of seminars and tutorials

Evaluation criterion

Notes will be assigned to the reports and the student will be evaluated by their participation in the seminars. The final grade will be calculated by the weighted average of these notes.

Recovery

-Approval Criterium: NP+(MREC/2.5), if MREC > or = 7.5; or max {np, mrec}, if mrec < or = 5.0; or 5.0 < or = mrec < 7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

Books, manuals and articles related to the selected topic.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0247 - NoSQL databases and distributed processing frameworks

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 15/07/2022 **Deactivation:**

Goals

To introduce the concepts, techniques and tools for large-scale data management and analysis, aimed at commercial applications for which the relational database paradigm does not provide the necessary support. The course aims to provide theory and practice so that students can apply NoSQL techniques and tools.

Responsible teacher (s) (s)

71532 - Caetano Traina Junior

2373891 - José Fernando Rodrigues Junior

4812924 - ROBSON LEONARDO FERREIRA CORDEIRO

Menu

This course will address the concepts that underlie non-relational databases (NoSQL), which are closely linked to distributed processing paradigms and frameworks.

Syllabus

Theory and practice in NoSQL databases; CAP Theorem (Consistency, Availability, Partitioning); large-scale data and cloud computing; storage models: by row, by column, and data compression. Graph-oriented databases; key-value structured databases; temporal databases; representation of textual and semi-structured data; JSON, JSONB, and XML. MapReduce Programming Model and the Hadoop framework; Spark framework with applications in Data Science.

Evaluation instruments and criteria

Evaluation method

Expository and Resolution Classes of Exercises/Course Projects.

Evaluation criterion

The final grade will be calculated by the weighted average of the test notes and exercises/course project.

Recovery

If MREC >= 7.5, final grade NP+(MREC/2.5) If 5.0 <= mrec < 7.5, final grade 5.0 If mrec <= 5.0, final note max {np, mrec}
(Np = 1st evaluation, mrec = proof)

Basic bibliography

Andreas Meier, Michael Kaufmann. SQL & NoSQL Databases: Models, Languages, Consistency Options and Architectures for Big Data Management. Springer.

O. Pivert, NoSQL Data Models trends and challenges, vol. 1: Wiley, 2018.

L. Perkins, E. Redmond, and J. R. Wilson, Seven Databases in Seven Weeks: A Guide to Modern Databases and the {NoSQL} Movement: Pragmatic Bookshelf, 2018.

J. Lu and I. Holubov, "Multi-model Databases: A New Journey to Handle the Variety of Data," ACM Comput. Surv., vol. 52, pp. 1-38, 2019.

A. Petrov, Database Internals: A Deep Dive into How Distributed Data Systems Work, 1 ed: O'Reilly, 2019.

G. Harrison, Next generation databases: NoSQL, NewSQL, and Big Data: Apress, 2019.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0770 - Introduction to Digital Games Development

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 01/01/2018 **Deactivation:**

Goals

The students are introduced to the field of digital games through classes, seminars and practical tasks developed in computer laboratories. Familiarize the student with the technological and methodological challenges of game development. Apply the theoretical and practical knowledge from different domains in Computer Science using an interdisciplinary approach. The student will be able to understand basic concepts and techniques for developing digital game applied to entertainment as well as serious games.

Menu

Technical and practical foundations of digital game development and application of computational concepts through its development.

Syllabus

Introduction to digital games, history, evolution, systematic, genres and state-of-the-art industry. Study of methodologies, development and documentation of a game project. Characteristics of hardware, software, technologies and tools. Architecture concepts, game engine and its components: physics engine, graphics rendering, animation, audio and scripting languages. Artificial intelligence techniques for games, multimedia and resources handling. Data structures and typical elements of games, concepts of scene and world. Real time simulation: input control, physics collision and computer graphics.

Evaluation instruments and criteria

Evaluation method

Classes, seminars and practices in the laboratory, accompanied by evaluations of the activities designated to students during the course.

Evaluation criterion

Weighted average of the grades of the activities performed.

Recovery

Recovery proof. Approval Criteria: $NP + (MREC/2.5)$, if $MREC >= 7.5$; or $\max\{np, mrec\}$, if $mrec <= 5.0$; or 5.0, if $5.0 <= mrec < 7.5$ ($np = 1$ st evaluation, $mrec = proof$).

Basic bibliography

Livro(s) texto(s):

- GREGORY, J. Game Engine Architecture. A K Peters, 2009. 1st Edition
- MCSHAFFRY, M.; GRAHAM, D. Game Coding Complete. Cengage Learning, 2012. 4th Edition.
- GOUVEIA, D. Getting Started with C++ Audio Programming for Game Development. Packt Publishing, 2013. 2^a ed.
- MILLINGTON, I., FUNGE, J. Artificial Intelligence for Games. Burlington, MA : Elsevier Morgan Kaufmann, 2009. 2nd Edition.
- SCHELL, J. The Art of Game Design: A Book of Lenses. Morgan Kaufmann Publishers, 2^a ed, 2014.
- CHANDLER, H. Manual de Produção de Jogos Digitais. Bookman, 2^a ed, 2012.

Bibliografia Complementar:

- SANTAELLA, L; FEITOZA, M. Mapa do Jogo. Cengage Learning, 2009. 1. ed.
- HUIZINGA, J. Homo Ludens. Perspectiva, 2012. 7^a ed.
- HARRIS, B. J. A Guerra dos Consoles. Intrínseca, 2015.
- EBERLY, D. 3D Game Engine Architecture Engineering Real-Time Applications with Wild Magic (The Morgan Kaufmann Series in Interactive 3D Technology). CRC Press, 2004.
- ERICSON, C. Real-Time Collision Detection (The Morgan Kaufmann Series in Interactive 3-D Technology). CRC Press, 2005.
- SCOTT, R. Level Up – Um Guia para o Design de Grandes Jogos. Blucher, 1^a Ed.
- KEITH, C. Agile Game Development with Scrum. Addison-Wesley, 2010.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0954 - Infrastructure for High Performance Computing and Distributed Systems

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Extension workload: 15 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

To teach how to create and maintain a basic infrastructure for parallel and distributed computing, applying, in a practical way, concepts of computer architectures, operating systems, computer networks, high performance computing and distributed systems.

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

The importance of the infrastructure for distributed computing. Visits to computers centers hosting such infrastructures. Design, installation and setup of a distributed infrastructure. Case studies of platforms for high performance computing. Execution of parallel and distributed applications on a distributed infrastructure. Performance evaluation of infrastructures.

Syllabus

The importance of the infrastructure for distributed computing: context, motivation and essential concepts; Case studies of platforms for high performance computing; Visits to computers centers hosting such infrastructures: to meet professionals to learn about hardware and software used currently; Design, installation and setup of a distributed infrastructure: to make a basic infrastructure for distributed computing, evolving aspects of hardware and software, mainly that one learned in computer architecture, operating systems, computer networks, high performance computing and distributed systems; Execution of parallel and distributed applications on a distributed infrastructure; Performance evaluation of infrastructures: metrics and methodologies.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work developed in and out of class.

Evaluation criterion

Weighted average notes in tests and works.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC> = 5; or max {np, mrec}, if mrec <5

Basic bibliography

Livro texto:

Raj, Pethuru; Raman, Anupama; Nagaraj, Dhivya; Duggirala, Siddhartha. High-Performance Big-Data Analytics: Computing Systems and Approaches (Computer Communications and Networks) 1st ed. Springer. 2015 ISBN-13: 978-3319207438 ISBN-10: 3319207431.

Bibliografia complementar:

Ma, Zongmin. Managing Big Data in Cloud Computing Environments (Advances in Systems Analysis, Software Engineering, and High Performance Computing) 1st Edition. IGI Global. 2016. ISBN-10: 1466698349 ISBN-13: 978-1466698345.

Yang, Laurence T., Guo, Minyi. High Performance Computing: paradigm and infrastructure. Wiley. 2005. ISBN-13: 978-0471654711 ISBN-10: 047165471X

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Provision of didactic material in various formats (reas, videos, tutorials), computational infrastructure assembly including servers, switches, routers, firewalls, storages, parallel processing rack and distributed in both CPUS and GPUS (graphic plates) environments (graphics) environments () environments rack.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in proposed activities. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic

Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0209 - Entrepreneurship in Informatics

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Developing the entrepreneurial skills of students, encouraging and providing tools to those whose professional vocation is aimed at creating an enterprise in informatics.

Responsible teacher (s) (s)

65312 - Solange Oliveira Rezende

Menu

Developing of entrepreneurial skills in Computer Science, focusing on the analysis of enterprise informatics, entrepreneur profile, management system, negotiation techniques, strategic planning and strategic management, quality and competitiveness.

Syllabus

Part I - Development of entrepreneurial capacity in Computing, with emphasis on the analysis of the IT business, profile of the entrepreneur, management system, negotiation techniques, strategic planning and strategic management, quality and competitiveness. Part II – Validation of the Business Hypothesis and Construction of a Business Model.

Evaluation instruments and criteria

Evaluation method

Exhibition in classes, discussion of concrete cases, encouraging research and writing business plans, panels, seminars, games.

Evaluation criterion

The grade will be calculated by the weighted average of the students obtained by the student during the semester.

Recovery

-Approval Criterium: $NP + (MREC/2.5)$, if $MREC > 7.5$; or $\max\{NP, MREC\}$, if $MREC \leq 7.5$; or 5.0 , if $5.0 < MREC \leq 7.5$. ($NP = 1^{\text{st}}$ evaluation, $MREC = \text{proof}$)

Basic bibliography

- Book (s) text (s):
 - Dornelas, Jose Carlos A. Entrepreneurship: turning ideas into business, ed. Campus, 2004.
 - Moacir de Miranda Oliveira Junior; Fernanda Ribeiro Cahen; Felipe Mendes Borini; Startups and Innovation Ecosystems in Emerging Markets to Brazilian Perspective. Cham Palgrave Macmillan 2019
- Complementary bibliography:
 - Ciage/FGV Business Plan, notebooks - 9
 - Investment Plan, Getúlio Vargas Foundation, São Paulo, 1992.
 - Harvard Business Review, Trials and Rewards of the Entrepreneur (A.K.A.) "TRE".
 - Ernest & Young Guide to develop your business plan, Record Publisher, 3rd edition, 1991.
 - Filion, L.J.; Vision and relationships: elements for a metamodel of entrepreneurial activity - International Small Business Journal, 1991 - Costa Translation, S.R.
 - Filion, L.J.; - Planning your business learning system: Identify a vision and evaluate your relationship system - Business Administration Magazine, FGV, São Paulo, Jul/Set. 1991, p. 31 (3): 63:71.
 - Salim, C.S.; HOCHMAN, N. RAMAL, S.A. Building Business Plans, Campus Publisher, 2001.
 - Dolabela, F. Luisa's secret, an idea, a passion and a business plan. Culture Editors Associates, 1999.
 - Tarcisio Teixeira; Alan Moreira Lopes; Keila dos Santos; Bernardo M. de C Oliveira; Augusto P. Coutinho Netto; Roberta Yvon Fixel; Marcio A. Noronha Costa Barueri, SP Manole 2017
 - Jerônimo Mendes Entrepreneurship 360 ° The practice in practice, São Paulo Atlas 2017
 - Peter Thiel Blake Masters; IVO KOYTOWSKIDE ZERO TO A WHAT TO LEARN ABOUT Entrepreneurship with Silicon Valley, Rio de Janeiro Objective 2018
 - Blank, Steve; DORF, Bob. Startup: Entrepreneurship Manual. The step by step guide to build a large company. High Books Publisher. 1st edition, 2014.
 - Thiel, Peter. From zero to one: what to learn about Silicon valley entrepreneurship. Objective. 1st edition, 2014

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of practical projects in topics of interest to society

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0241 - Databases Laboratory

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 01/01/2025 **Deactivation:**

Goals

Development of practical applications using relational database systems and related tools. Consolidation of the theory developed in the Database course (SCC0240).

Responsible teacher (s) (s)

2373891 - José Fernando Rodrigues Junior

Menu

SQL (Structured Query Language). Programming language for management database systems. Multiuser access. Development of database applications.

Syllabus

SQL (Structured Query Language): data definition language and data manipulation language. Database integrity and security: concepts and SQL commands. Analytical SQL commands. Views, triggers and stored procedures. Multiuser access. Development of applications using the database client/server technology.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises. Application Demonstration Classes. Study with activities using laboratory microcomputers.

Evaluation criterion

Average of laboratory exercises and final work exercises.

Recovery

If MREC >= 7.5, final grade NP+(MREC/2.5) If 5.0 <= mrec < 7.5, final grade 5.0 If mrec <= 5.0, final note max {np, mrec}
(Np = 1st evaluation, MREC = Recovery Note)

Basic bibliography

Text Book:

- SILBERSCHAT, A.; KORTH, H.F.; SUCARSHAN, S. - Database Systems, 6th edition. Editora Elsevier Brazil, 2012 ISBN 9788535245356.
- ELMASRI, R.; NAVATHE, S.B. Database systems, 6th edition. Publisher Pearson, 2011, ISBN 9788579360855.
- PRICE, J. - Oracle Database 11g SQL, Editora Artmed, 2008, ISBN 9788577803354.
- McLaughlin, J. M. - Oracle Database 11g - PL/SQL Programming, Publisher Alta Books, 1st Edition, 2009, ISBN 9788576083894.

Complementary Bibliography:

- BATINI, C.; CERI, S.; NAVATHE, S.B. Conceptual Database Design: an Entity-Relationship Approach. Benjamin/Cummings Pub. Co., 1992, ISBN 0805302441.
- DATE, C.J. Introduction to database systems. Translation of the 7th American Edition Editora Campus, 2000. ISBN 8535205608.
- Heuser, C.A. Database Project. SAGRA LUZZATTO, 2001. ISBN 8524105909.
- O'NEIL, P.; O'NEIL, E. Database: Principles, Programming, and Performance, 2nd edition, Morgan Kaufmann Publishers, 2001. ISBN 1558605800.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0243 - Architecture of Database Management Systems

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 01/01/2012 **Deactivation:**

Goals

The goal is to provide the students with advanced concepts, techniques, and characteristics related to database management systems, complementing the content taught in former fundamental disciplines of databases. The course shall offer the knowledge expected from a professional engaged in administration and management of databases.

Menu

Transaction processing, concurrency control, fail recovery, processing and optimization of queries, distributed databases, fine tuning, and performance.

Syllabus

Introduction to the concepts and to the theory of transaction processing. Concurrency control techniques: two-phase commit protocol and other techniques. Fail recovery techniques: undo/redo algorithm. Query processing and optimization algorithms. Distributed databases: concepts, fragmentation, replication and data allocation techniques, types of systems, query processing, concurrency control, and recovery. Fine tuning: concepts, databases physical design, and file-indexing structures.

Evaluation instruments and criteria

Evaluation method

Theoretical exposure, followed by exercises, seminars and practical work with or without computer use.

Evaluation criterion

Notes will be assigned to practical work and seminars, and will be proposed in the classroom. The final grade will be calculated by the weighted average of these notes.

Recovery

Realization: Until the first week of later semester classes -Approval Criterium: NP+(MREC/2.5), if MREC > or = 7.5; or max {np, mrec}, if mrec < or = 5.0; or 5.0, if 5.0 < or = mrec < 7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

- Text book:

- ELMASRI, R.; NAVATHE, S.B. Fundamentals of Database Systems, 4th edition. Pearson/Addison Wesley 2004, ISBN 0321122267.
- SILBERSCHATZ, A.; KORTH, H.F.; SUCARSHAN, S. - Database Systems, 3rd edition. Makron Books Publishing House, 1999, ISBN 8534610738.

- Complementary bibliography:

- BATINI, C.; CERI, S.; NAVATHE, S.B. Conceptual Database Design: an Entity-Relationship Approach. Benjamin/Cummings Pub. Co., 1992, ISBN 0805302441.
- DATE, C.J. Introduction to database systems. Translation of the 7th American Edition Editora Campus, 2000. ISBN 8535205608.
- Heuser, C.A. Database Project. SAGRA LUZZATTO, 2001. ISBN 8524105909.
- O'NEIL, P.; O'NEIL, E. Database: Principles, Programming, and Performance, 2nd edition, Morgan Kaufmann Publishers, 2001. ISBN 1558605800.
- RAMAKRISHNAN, R.; GEHRKE, J. Database Management Systems, 3rd edition. McGraw-Hill, 2003, ISBN 0072465638.

Cont.

continuation

- Setzer, V.W. Database: concepts, models, managers, logical project, physical project, 3rd edition. Edgard Blucher, 1989.
- TOEREY, T.; Lightstone; S.; Nadeau, T. Database Modeling & Design: Logical Design. 4th edition. Elsevier: Morgan Kaufmann Publishers, 2005. ISBN 0126853525.
- ULLMAN, J.D., WIDOM, J. A First Course in Database Systems. Prentice Hall, 1997. ISBN 0138613370.
- VOSSEN, G. Data Models, Database Languages and Database Management Systems. Addison-Wesley Pub., 1991. ISBN 0201416042.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0245 - Data Analytical Processing

Class Credits: 3

Work Credits: 2

Total workload: 105 h

Extension workload: 30 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Responsible teacher (s) (s)

5357762 - Cristina Dutra de Aguiar

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Theoretical exposure, followed by exercises, seminars and practical work with computer use.

Evaluation criterion

Notes will be assigned to practical work and seminars, and will be proposed in the classroom. The final grade will be calculated by the weighted average of these notes.

Recovery

-Approval Criterium: NP+(MREC/2.5), if MREC > or = 7.5; or max {np, mrec}, if mrec < or = 5.0; or 5.0 < or = mrec < 7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

- Book (s) text (s):
 - KIMBALL, R., ROSS, M. The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling, 2nd edition. John Wiley and Sons, Inc., 2002. ISBN 0-471-20024-7.
 - Complementary bibliography:
 - Articles of journals and congresses related to analytical data processing.
 - BERSON, A., SMITH, S. Data Warehousing, Data Mining, and OLAP. McGraw-Hill, 1997.

- ISBN 0-07-006272-2.
- IMHOFF, C., GALEMBO, N., GEIGER, J.G. Mastering Data Warehouse Design: Relational and Dimensional Techniques. Wiley Publishing Inc., 2003. ISBN 0-471-32421-3.
 - INMON, W.H. Building the Data Warehouse, 4th edition. Wiley Publishing Inc, 2005. ISBN 0-7645-9944-5.
 - KIMBALL, R., CASERTA, J. The Data Warehouse ETL Toolkit: Practical Techniques for Extracting, Cleaning, Conforming, and Delivering Data. Wiley Publishing Inc., 2004. ISBN 0-764-56757-8.
 - KIMBALL, R., ROSS, M., THORNTHWAITE, W., MUNDY, J., BECKER, B. The Data Warehouse Lifecycle Toolkit: Practical Techniques Building Data Warehouse and Business Intelligence Systems, 2nd edition. Wiley Publishing Inc., 2008. ISBN 0-470-14977-9.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of practical work in topics of interest to society.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0251 - Image Processing

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Give the student the knowledge necessary to manipulate digital images, presenting related application areas and major techniques in the field.

Responsible teacher (s) (s)

2085191 - AGMA JUCI MACHADO TRAINA

Menu

Image processing fundamentals; image enhancement; gray scale transformation techniques; image smoothing, image sharpening; spatial filters; image transforms; segmentation; restoration; Segmentation, Representation and Pattern Recognition.

Syllabus

Origin and objectives of image processing. Computer vision fundamentals and relationship with human vision. Devices and image acquisition. Quantization and Sampling. Color systems. Gray level transformation techniques. Smoothing. Edge sharpening. Frequency domain transforms: Fourier. Image segmentation. Image analysis: feature extraction and notions of representation and classification. Pattern Recognition.

Evaluation instruments and criteria

Evaluation method

Tests and/or practical work

Evaluation criterion

The student's final average is a combination of test grades, practical work and eventually other activities, whose weights will be defined by the teacher and disclosed to students at the beginning of the semester.

Recovery

If there is evidence, then there will be a recovery test, which may be written or even oral. If there is only work, then the disabled parts of the work will be requested to be redone.

Basic bibliography

Book (s) text (s):

- Gonzalez, R.C.; WOODS, R.E. Digital Image Processing. Sao Paulo: Pearson Prentice Hall, 3.ed, 2010.
- Gonzalez, R.C.; Woods, R.E. Digital Image Processing. Pearson Prentice Hall, 3rd. Edition, 2007.

Complementary Bibliography:

- Petrou, M. Image Processing: the fundamentals, 2.ed. Chichester: Wiley, 2010.
- Bradski, G. R.; Kaehler, A.. Learning OpenCV: computer vision with the OpenCV library. Sebastopol: O Reilly, 2008.
- Parker, J. R. Algorithms for image processing and computer vision, 2.ed. Indianapolis: Wiley, 2010.
- Nixon, M. S.; Aguado, A. S. Feature extraction and image processing. Amsterdam: Academic, 2008.
- Pratt, W. K. Digital image processing, 4.ed. Hoboken: Wiley-Interscience, 2007.

Extension activities

Social Group target of the activity

External community (public school students, people wishing to join the university, private or public companies and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of materials on image processing, editing and filtering methods. Disclosure of explanatory materials on methods, ethics and disseminated use on mobile computing and social networks.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0260 - Human-Computer Interaction and User Experience

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Introduce students to the human-computer interaction foundations. Enable students to discuss current research topics in the field. Provide students with the necessary expertise to design and evaluate interfaces.

Responsible teacher (s) (s)

6346511 - Kamila Rios da Hora Rodrigues

2084609 - Maria da Graça Campos Pimentel

92588 - Renata Pontin de Mattos Fortes

Menu

Basic concepts of Human-Computer Interaction. Theoretical Approaches in HCI. Human and technological aspects. User Experience (UX). Design Processes. Identification of User Needs and Requirements in IHC. Principles and guidelines for design. Assessment methods in IHC.

Syllabus

Introduction to fundamental concepts of the interaction between human and computer. Generations of interfaces and interaction devices. Design principles. Experimental and Applied Cognitive Psychology. Cognitive Engineering and Semiotic Engineering. Contextual design, based on scenarios and focused on communication. Design Thinking. Agile Methods and IHC. Techniques for gathering requirements. Human Aspects. Technological aspects. Prototyping techniques. Usability engineering lifecycle. Principles and heuristics for usability and accessibility. Methods for assessing usability and accessibility. Adaptable systems and adaptive systems. Patterns and guidelines for designing interfaces. Development of a project involving the construction and evaluation of interfaces, with good UX/UI requirements.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by practical activities inside and outside the classroom. Practical work involving the use of instruments and techniques for the design and evaluation of interfaces, as well as the use of available tools, including those developed

in other subjects and/or by other students. Development of a practical project putting into practice concepts and techniques studied in the discipline, especially concepts for an interface with good UX/UI requirements.

Evaluation criterion

Notes and tests, exercises and practical work will be assigned, some in the classroom and others outside the room. The final grade will be calculated by the weighted average of the grades obtained by the student during the semester.

Recovery

Approval Criteria: $NP + (MREC/2.5)$, if $MREC > or = 7.5$; or $\max\{np, mrec\}$, if $mrec < or = 5.0$; or $5.0 < or = mrec < 7.5$.
(np = 1st evaluation, mrec = proof)

Basic bibliography

Text Book:

- Complocate, J., Rogers, Y., Sharp, H. Interaction Design: In addition to human-computing interaction. Bookman, 2013
- Heloísa Vieira da Rocha, Maria Cecilia Calani Baranauskas Design and Evaluation of Human-Computer Interfaces. NIED/UNICAMP. 2003. Available at: <https://www.nied.unicamp.br/biblioteca/design-e-avaliacao-de-interfaces-humano-computer/>

Complementary Bibliography:

- BARBOSA, S. D. J.; SILVA, B. S. da; SILVEIRA, M. S.; GASPARINI, I.; DARIN, T.; BARBOSA, G. D. J. (2021) Human-Computer Interaction and User Experience. Self -publishing. Leanpub.
- Lazar, J., Feng, J., Hochheiser, H. Research Methods in Human-Computer Interaction. 2nd edition. Morgan Kaufmann. 2017.
- Norman, D. Emotional Design. ROCCO, 2008.
- Krug, S. Don't make me think: an approach to common sense to web navigability. Sao Paulo: Market Books, 2001.
- Shneiderman, B. Designing the user-interface. 2 ed. Addison Wesley, 1992.
- Nielsen, J. Usability Engineering. Academic Press, 1993.
- Baeker, R.M.; GRUDIN, T.; BRIXTON, W. A.; GREENBERG, S. Readings in Hunan Computer Interaction: Toward The Year 2000, 2nd Edition, Morgan Kaufmann, 1995.
- Dix, A.; FINLAY, J.; ABIWD, G.; BEALE, r. -Human-Computer Interaction.2nd edition, Prentice-Hall, 1998.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of a web project or mobile by designing resource implementation to meet the usability requirements and accessibility in interfaces Software). Proposal of courses and lectures on the good practices learned in the discipline. Provision of online material to other students and professionals in the field.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0261 - Multimedia

Class Credits: 2

Work Credits: 0

Total workload: 30 h

Type: Semester

Activation: 15/07/2020 **Deactivation:**

Goals

The goals are introduce multimedia concepts and investigate problems related with the computational support to media data and to multimedia applications.

Responsible teacher (s) (s)

2162972 - Rudinei Goularte

Menu

Media data types: text, image, graphics, audio, video, animation. Standards. Media data processing: capture, storage, compression, transmission. Multimedia applications.

Syllabus

Multimedia basics definitions. Introduction to digitalization and compression of different media types: text, audio, image, graphics, video and animations. Aspects of capture, storage and transmission of different media types. Multimedia standards to data coding and transmission. Tools and languages to multimedia applications development.

Evaluation instruments and criteria

Evaluation method

Theoretical classes followed by practical demonstration in multimedia equipment. Exercises prepared in laboratory classes.

Evaluation criterion

Average notes in practical computer exercises (laboratory) and final test.

Recovery

Realization: Until the first week of later semester classes -Approval Criterium: NP+(MREC/2.5), if MREC > or = 7.5; or max {np, mrec}, if mrec < or = 5.0; or 5.0, if 5.0 < or = mrec < 7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

Text Book:

- HALSALL, F. Multimedia Communications applications, networks, protocols and standards ed. Addison-Wesley, 2001.
- LUTHER, A.C. Digital Video Using, Publisher AP Professional, 1995.
- STEINMETZ, Ralf; NAHRSTEDT, Klara. Multimedia: Computing, Communications and Applications. Prentice Hall, Hardcover, Published May 1995, ISBN 0133244350. 1995.
- GIBSON, Jerry D. (Editor) Digital Compression for Multimedia: Principles and Standards. Morgan Kaufmann, ISBN 15586036. 1998.
- PEREIRA, F.; EBRAHIMI, T. The MPEG-4 Book. Upper Saddle River: Prentice Hall PTR, 2002.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0270 - Neural Networks and Deep Learning

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

To present to the students the basic concepts of Artificial Neural Networks and the current most important models. To analyze the behavior of these models, their fundamental capabilities and limitations, allowing the use of these techniques to solve practical problems.

Responsible teacher (s) (s)

5890222 - Diego Furtado Silva

2084609 - Maria da Graça Campos Pimentel

55735 - Roseli Aparecida Francelin Romero

Menu

Introduction of artificial neural network models for classification / prediction of patterns and applications.

Syllabus

Definition of connectionist models. Learning in connectionist models: supervised, unsupervised, and competitive learning. Basic architectures: Perceptron, Adaline, Multi-Layer Perceptron, RBF Networks. Deep learning: convolutional architectures (CNN), encoder-decoder, adversarial networks, transfer learning, recurrent networks and attention models. Self-organization systems: PCA, LDA and Kohonen network. Associative Memories: Hopfield Networks. Applications.

Evaluation instruments and criteria

Evaluation method

Theoretical classes, exercises and practical work inside and outside the class

Evaluation criterion

Notes will be assigned to tests and/or practical work. The final grade will be calculated by the average grades obtained by the student during the semester.

Recovery

Until the first week of later semester classes - Approval criteria: NP+(MREC/2.5), if MREC> or = 7.5; or max {np, mrec}, if mrec> or = 5.0; or 5.0, if 5.0 <or = mrec <7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

- Livros texto:

BRAGA, A.; CARVALHO, A.; LUDERMIR, T. "Redes Neurais Artificiais: Teoria e Aplicações", Livro Técnico e Científico, Rio de Janeiro, 2000.
HAYKIN, S. "Neural Networks. A Comprehensive Foundation", New Jersey, Prentice Hall, 2 ed., 1999.
GOODFELLOW, I. "Deep Learning". The Mit Press. 2016. 775p.

-Bibliografia Complementar:

FRANCELIN, R.A., "Uma Introdução a Redes Neurais", Anais do Workshop sobre Redes Neurais, UFSCar, setembro, 1992.
HERTZ,J.; JROGH,A.; PALMER,R.G. "Introduction to the Theory of Neural Computation", Addison-Wesley Publishing Company, CA, 1991.
LIPPmann,R.P. "An Introduction to Computing with Neural Nets", IEE-ASSP Magazine, Vol. 4, No. 2, abril, 1987.
PEDRYCZ,W. "Fuzzy Control and Fuzzy Systems", 2 ed., Tauton, Research Studies, 1993.
RUMELHART,D.; HINTON,G.; WILLIAMS,R. "Learning Internal Representations by Error Propagation", In: Rumelhart,D. & McClelland, J. Parallel Distributed Processing: Explorations in the Microstructure of Cognition, Vol. 1, Cambridge MA/MIT Press, 1986.
Deep Learning Tutorial, Release 0.1, LISA lab, University of Montreal, September 01, 167 p., 2015.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of group projects to raise awareness of the population on deep neural networks and their impacts on the use of everyday technology. Courses for society, lectures and content production.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0276 - Machine Learning

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Responsible teacher (s) (s)

5890222 - Diego Furtado Silva

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Exercises and practical work inside and outside the class. Practical classes using microcomputer simulations. Seminars for discussion of results obtained in the applications. Participation of practical classes and seminars. Practical work extraclasses. Minister seminars.

Evaluation criterion

Notes will be assigned to practical work and participation in discussions and seminars. The final grade will be calculated by the weighted average of the grades obtained by the student during the semester.

Recovery

Approval Criteria: NP + (MREC/2.5), if MREC > or = 7.5; or max {np, mrec}, if mrec < or = 5.0; or 5.0, if 5.0 < or = mrec < 7.5.
(np = 1st evaluation, mrec = proof)

Basic bibliography

Stuart Russell; Peter Norvig. Artificial Intelligence: A Modern Approach, Pearson Education Limited; 4^a edition, 2021.

Katti Faceli, Ana Carolina Lorena, João Gama, Thiago Agostinho de Almeida, André C.P.L.F. de Carvalho, Inteligência Artificial - Uma Abordagem de Aprendizado de Máquina, LTC; 2^a

edição, 2021.
Alpaydin, E. (2004). Introduction to Machine Learning. MIT Press.
Mitchell, T. M. (1997). Machine Learning. McGraw-Hill.
Flach, P. (2012). Machine Learning: The Art and Science of Algorithms that Make Sense of Data. Cambridge University Press.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Conducting group projects to raise awareness of the machine learning-based algorithms and their impacts on the use of everyday technology. Projects with Companies, courses for society, lectures and content production.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0282 - Information Retrieval

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Responsible teacher (s) (s)

5055859 - Marcelo Garcia Manzato

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Theoretical classes, accompanied by practical work and case studies within the classroom.

Evaluation criterion

Weighted average of tests and practical work performed during the course.

Recovery

Recovery proof. Approval Criteria: $NP + (MREC/2.5)$, if $MREC \geq 7.5$; or $\max\{NP, MREC\}$, if $MREC \leq 5.0$; or 5.0, if $5.0 \leq MREC < 7.5$ ($NP = 1^{\text{st}}$ evaluation, $MREC = \text{proof}$).

Basic bibliography

Text Books

- Ricardo A. Baeza-Yates and Berthier Ribeiro-Neto. 2012. Modern Information Retrieval. 2nd edition. ACM Press Books.
- Ricardo A. Baeza-Yates and Berthier Ribeiro-Neto. 2013. Information Recovery – Concepts and Technology of Search Machines. 2a. edition. Bookman.

Complementary bibliography

Conferences and journals in the area.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Conducting group projects to raise awareness of the population about information recovery algorithms and their impacts on the use of everyday technology. Conducting courses for society, lectures and content production.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0284 - Recommender Systems

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Responsible teacher (s) (s)

5055859 - Marcelo Garcia Manzato

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Theoretical classes, accompanied by practical work and case studies within the classroom. Elaboration of a project.

Evaluation criterion

Weighted average of tests and practical work performed during the course.

Recovery

Recovery proof. Approval Criteria: $NP + (MREC/2.5)$, if $MREC \geq 7.5$; or $\max\{NP, MREC\}$, if $MREC \leq 5.0$; or 5.0, if $5.0 \leq MREC < 7.5$ ($NP = 1^{\text{st}}$ evaluation, $MREC = \text{proof}$).

Basic bibliography

Livros texto

1. Recommender Systems: An Introduction, Dietmar Jannach, Markus Zanker, Alexander Felfernig, Gerhard Friedrich. Cambridge University Press, 2010.
2. Recommender Systems Handbook, Francesco Ricci, Lior Rokach, Bracha Shapira, Paul B. Kantor. Springer-Verlag, 2010.

Bibliografia complementar

Textos relacionados à disciplina.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Conducting group projects to raise awareness about the algorithms of recommendation systems and their impacts on the use of everyday technology. Conducting courses for society, lectures and content production.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0370 - Introduction to Bio-inspired Computing

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 01/01/2025 **Deactivation:**

Goals

Provide biological concepts related to bio-inspired computing, bio-inspired computational methods and their use in practice.

Responsible teacher (s) (s)

2373891 - José Fernando Rodrigues Junior

Menu

Basic bio-inspired computational methods.

Syllabus

Neural Networks, Evolutionary Computation, Swarm Intelligence (Particle Swarm, Ant Colonies), Artificial Immune Systems, DNA Based Computation.

Evaluation instruments and criteria

Evaluation method

Theoretical classes, followed by exercises and practical work inside and outside the class. Practical classes using microcomputer simulations.

Evaluation criterion

Notes will be assigned to tests and/or practical work. The final grade will be calculated by the weighted average of the grades obtained by the student during the semester.

Recovery

Realization: Until the first week of later semester classes -Approval Criterium: NP+(MREC/2.5), if MREC> or = 7.5; or max {np, mrec}, if mrec <or = 5.0; or 5.0, if 5.0 <or = mrec <7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

- Castro, L. Fundamentals of Natural Computing , Chapman & Hall/CRC, 2006.
- Braga,A.; Carvalho, A.; Ludermir, T. "Redes Neurais Artificiais: Teoria e Aplicações",

- segunda edição, Livro Técnico e Científico, Rio de Janeiro, 2007.
- Haykin, S. "Neural Networks. A Comprehensive Foundation", New Jersey, Prentice Hall, 2 ed., 1999.
 - Arkin, R. C., Behavior-based robots , MIT Press, 1998.
 - Kortenkamp, D.; Bonasso, R.P., Murphy, R. (Eds.), Artificial Intelligence and Mobile Robots , The MIT Press, 1998.Mitchell M., An Introduction to Genetic Algorithms, The MIT Press, 1999.
 - Ribeiro, C.; Reali, A. e Romero, R., Robôs Móveis Inteligentes: Princípios e Técnicas , Capítulo de livro da I Jornada de Atualização em Inteligência Artificial - JAIA 2001, Anais do XXI Congresso da SBC, vol. 3, pp.257-306, 2001.
 - Baldi, P.; Brunak, S. "Bioinformatics: Adaptive Computation and Machine Learning", MIT Press, 1998.
 - Bäck, T., Fogel, D. B., Michalewicz, Z., Handbook of Evolutionary Computation, Institute of Physics Publishing and Oxford University Press, 1997.
 - Angeline, P. J., Kinnear, K. E., Advances in Genetic Programming, The MIT Press, 1996.
 - Goldberg, D. E., Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley Publishing Company, Inc., 1989.
 - Boden, M., The Philosophy of Artificial Life. Oxford University Press, 1996.
 - Bonabeau, E.; Dorigo, M.; e Théraulaz, G., Swarm Intelligence: From Natural to Artificial Systems. Oxford University Press, 1999.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0633 - Natural Language Processing

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

To introduce the students to the techniques, theories and models used in Natural Language Processing, enabling the student to develop computational resources, tools and applications that deal with human language, as well as to develop research in the area.

Responsible teacher (s) (s)

3761610 - Thiago Alexandre Salgueiro Pardo

Menu

Introduction to Natural Language Processing. Techniques, methods and models for developing Natural Language Processing resources, tools, and applications. Recent topics in the area.

Syllabus

Overview of the Natural Language Processing (NLP) area and its relationship with Computer Science and Linguistics areas. History of the area and its main landmarks. Levels of linguistic representation and processing: phonetics and phonology, morphology, syntax, semantics, discourse and pragmatics. Familiarization and practice with NLP resources, tools and applications. Approaches and paradigms for solving NLP problems. Corpus construction and annotation. Design and development of a NLP computational prototype. Presentation of current relevant NLP topics, as well as associated models and methods.

Evaluation instruments and criteria

Evaluation method

Exhibition classes and practical exercises.

Evaluation criterion

Mandatory evidence and possible complementary exercises.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC >= 7.5; or max {np, mrec}, if mrec <= 5.0; or 5.0, if 5.0 <= mrec < 7.5 (np = 1st evaluation, mrec = proof).

Basic bibliography

Livros texto

- Jurafsky, D. and Martin, J.H. (2008). Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition. Prentice Hall. Parcialmente disponível em <https://web.stanford.edu/~jurafsky/slp3/>

Bibliografia complementar

- Manning, C.D. and Schütze, H. (1999). Foundations of Statistical Natural Language Processing. 1a. edição. The MIT Press.
- Mitkov, R. (2005). The Oxford Handbook of Computational Linguistics. Oxford University Press.
- Ferreira, M. e Lopes, M. (2019). Para Conhecer Linguística Computacional. 1a edição. Editora Contexto.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of practical projects related to applications in topics of interest to society.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0910 - Advanced Topics in Computer Science I

Class Credits: 3

Work Credits: 2

Total workload: 105 h

Type: Semester

Activation: 15/07/2019 **Deactivation:**

Goals

Introduce students to more advanced topics in Computer Science, including theory and practice.

Responsible teacher (s) (s)

793065 - John of the Holy Spirit Batista Neto

2373891 - José Fernando Rodrigues Junior

2084609 - Maria da Graça Campos Pimentel

Menu

Topics that are not part of the subject grid, nor of the list of elective subjects.

Syllabus

Presentation of the motivation behind the theme of the discipline. Implications in the universe of Computer Science. Theory that underlies the theme and its ramifications. Application examples. Theoretical and/or practical project.

Evaluation instruments and criteria

Evaluation method

Evidence, works, exercises and seminars related to the concepts treated in the classes.

Evaluation criterion

NP = Weighted average of the test notes, works, exercises, and seminars, at the teacher's discretion.

Recovery

NP+(MREC/2.5), if MREC >= 7.5; or max {np, mrec}, if mrec <= 5.0; or 5.0, if 5.0 <= mrec < 7.5 (NP = 1st evaluation, MREC = Recovery Test Note).

Basic bibliography

BROOKSEHAR, J. G .. Computer Science. A comprehensive view. 11th. Edition, Bookman, 2013.

CARVALHO, A.C.P.L.F., LORENA, A.C.; Introduction to computing. Hardware, software and data. LTC Publishing House, 2017.

FEDELI, R.D.; Introduction to Computer Science. 2nd. Edition. Cengage Publisher, 2009.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SME0130 - Complex Networks

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 01/01/2012 **Deactivation:**

Goals

Introduce the basic concepts of complex networks theory according to the presentation of the fundamental tools for representation, modeling, characterization and classification of complex networks. These concepts are applied in the analysis of the Internet, World Wide Web, language, society, food webs, cellular interactions and road networks.

Menu

Representation of complex networks, measures for topological characterization of networks, weighted networks, dynamics processes in complex networks, classification of complex networks, applications.

Syllabus

Introduction and motivation. Representation of complex networks. Measures for topological characterization of complex networks: degree, clustering coefficient, number of cycles, shortest path length, motifs, centrality measures, spectral measures, hierarchical measures, fractal measures, community structure. Models and algorithms for generation of networks: random graphs, small world model, scale-free networks, hierarchical networks, and configuration model. Weighted networks. Spatial networks. Methods for community identification. Dynamical processes in complex networks: random walks, failures and attacks, cascade failures, communication and jamming, epidemic spreading, opinion formation, synchronization and collective behavior. Optimization in complex networks: flow optimization and resilience. Search in networks and navigation. Generating function. Algorithms: page-rank, betweenness centrality, community detection, synchronization, cascade failures, random walks. Applications: social networks, Internet, World Wide Web, bioinformatics, brain, road networks, language, image processing, pattern recognition. Classification of complex networks.

Evaluation instruments and criteria

Evaluation method

Exhibition classes and implementation of algorithms.

Evaluation criterion

Theoretical tests and practical work. The final grade will be calculated by the weighted average of the grades obtained by the student during the semester.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests.

Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

$$MF = 5 \text{ se } 5 \leq MR \leq (10 - MS)$$

$$MF = (MS + MR) / 2 \text{ se } MR > (10 - MS)$$

$$MF = MS \text{ se } MR < 5$$

Basic bibliography

Text Book:

- Mark Newman, Networks: An Introduction, Oxford University Press, 2010, ISBN 978-0-199-20665-0
- S. Boccaletti et al., Complex Networks: Structure and Dynamics, Phys. Rep., 424 (2006), 175-308.
- Luciano da F.Costa, Osvaldo N. Oliveira Jr., Gonzalo Travieso, Francisco Aparecido Rodrigues, Paulino R. Villas Boas, Lucas Antiqueira, Matheus P. Viana, Luis E. C. da Rocha, Analyzing and Modeling Real-World Phenomena with Complex Networks: A Survey of Applications, Advances in Physics, 2011.

Complementary Bibliography:

- Alain Barrat, Marc Barthelemy, Alessandro Vespignani, Dynamical processes in complex networks, Cambridge University Press, 2008, ISBN 978-0-521-87950-7
- Luciano da F. Costa, Francisco Aparecido Rodrigues, Gonzalo Travieso and P. R. Villas Boas, Characterization of complex networks: A survey of measurements, Advances in Physics, Volume 56, pages 167 - 242, 1, (2007)
- M. E. J. Newman, The structure and function of complex networks, SIAM Review 45, 167-256 (2003)
- Diestel, R., Graph Theory, Springer-Verlag Heidelberg, New York, 2005.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SME0806 - Computational Statistics

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 01/01/2014 **Deactivation:**

Goals

Study computational techniques used in the solution of statistical problems.

Menu

Robust estimation. Pseudo-random numbers and applications. Resampling methods. Numerical Optimization. Markov chain Monte Carlo methods. Robust regression.

Syllabus

1. Robust measures of location and scale. 2. Pseudo-random numbers and applications. 3. Resampling methods: bootstrap and jackknife. 4. Numerical optimization: Newton-Raphson methods, Fisher score and quasi-Newton methods. 5. The EM algorithm. 6. Markov chain Monte Carlo methods: the Gibbs sampler and the Metropolis-Hastings algorithm. 7. Notions of robust regression.

Evaluation instruments and criteria

Evaluation method

Theoretical lectures and practical laboratory classes.

Evaluation criterion

Weighted average of the test notes and practical work.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests.

Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

$$MF = 5 \text{ se } 5 \leq MR \leq (10 - MS)$$

$$MF = (MS + MR) / 2 \text{ se } MR > (10 - MS)$$

$$MF = MS \text{ se } MR < 5$$

Basic bibliography

TEXT BOOKS:

- Bustos, O.; FREY, A. Stockcastic simulation: theory and algorithms. São Paulo:

Brazilian Statistics Association, 1992.

- ROSS, S. Simulation . 4a ed., Oxford: Elsevier Academic Press, 2006.

Complementary Bibliography:

- Frery, A.; CRIBARI-NET, F. Computational Statistics Elements using Free Software Platforms. Rio de Janeiro: 25th Brazilian Mathematics Colloquium, SBM, 2005.

- TANNER, M.A. Tools for Statistical Inference . 3^a ed., New York: Springer, 1996.

- THISTED, R.A. Elements of Statistical Computing . Boca Raton: Chapman & Hall/CRC, 1988.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0141 - Practice in Operating Systems

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 15/07/2017 **Deactivation:**

Goals

Exercising the basic concepts seen on Operating Systems I and introducing the students to the technical and implementation aspects associated the theory studied in the former discipline.

Menu

Review of basic concepts on operating systems. Case study of industrial standards and real-world operating system. Practice in design and implementation involving access and programming of modern operating systems' resources.

Syllabus

Review of basic concepts on operating systems. Case study of industrial standards POSIX IEEE 1003, ISO/IEC 945) and real-world operating system. Practice in design and implementation involving access and programming of modern operating systems' resources: process execution, manipulation of input-output, terminal control, job management, threads, synchronization mechanisms, file systems

Evaluation instruments and criteria

Evaluation method

Exhibition classes followed by resolution of exercise in the room.

Evaluation criterion

Weighted average of the notes in tests and proposed exercises.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC> = 5; or max {np, mrec}, if mrec <5

Basic bibliography

- Text book:
 - TANENBAUM, A.S. Modern Operating Systems. Prentice-Hall, 2001
 - TANENBAUM, A. S. Operating Systems: Design and Implementation. Prentice Hall, 2006, 3rd BK&CD edition, ISBN 0131429388.
 - OLAF K.; TERRY D. Linux Network Administrator Guide. 2nd Edition, O Reilly & Associates, Inc., 2000.

- Complementary bibliography:
 - LOVE, R. Linux Kernel Development. SAMS, 1st edition, ISBN: 0672325128, 2003.
 - STEVENS, W. UNIX Network Programming. McGraw-Hill, 1990.
 - COFFIN, S. UNIX: The Complete Reference. Osborne McGraw-Hill, 1988.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0147 - Special Topics in Computer Systems I

Class Credits: 3

Work Credits: 0

Total workload: 45 h

Type: Semester

Activation: 01/01/2009 **Deactivation:**

Goals

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Exhibition classes. Seminars. Practical classes in the laboratory.

Evaluation criterion

The student will be evaluated for their participation in practical classes, their performance in the seminars and the execution of the proposed work.

Recovery

$(NP - 2) / 5 * MREC + 7 - NP$, if $MREC >= 5$; or $\max \{np, mrec\}$, if $mrec < 5$

Basic bibliography

*Books, manuals and articles related to the selected topic

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0154 - Advanced Lectures in Distributed Systems and Concurrent Programming I

Class Credits: 3

Work Credits: 0

Total workload: 45 h

Type: Semester

Activation: 01/01/2009 **Deactivation:**

Goals

Provide to students advanced concepts in Distributed Systems and Concurrent Programming, allowing the students to know some of the main developing research in the principal national and international research centers. It also aims at motivating the undergraduate research and strength the link between department graduation and post-graduation, encouraging the undergraduate students to apply to the special graduation/post-graduation program called "trilha".

Menu

Syllabus

Selected topics in Distributed Systems, Concurrent Programming, Computer Architecture and implementations, Performance Evaluation or Computer Networks, following the evolution in the area, as well as the relevant research projects in the Distributed System and Concurrent Programming area.

Evaluation instruments and criteria

Evaluation method

Lectures, seminars, meetings with responsible teacher, execution of the proposed work

Evaluation criterion

The student will be evaluated for their participation in practical classes, their performance in seminars, reports presented and in the execution of the proposed work.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC >= 5; or max {np, mrec}, if mrec < 5

Basic bibliography

Periodicals and congresses related to the selected themes.

- Software Practice & Experience
- Communications of the ACM
- Computer IEEE
- ACM Computing Surveys

- Computer Journal
- Lecture Notes in Computer Sciences
- Int'l Symposium on Computer Performance Modeling, Measurement, and Evaluation
- Journal of Parallel and Distributed Computing
- IEEE Transactions on Parallel and Distributed System
- IEEE Parallel & Distributed Technology
- Workshop on Job Scheduling Strategies for Parallel Processing
- Workshop on Job Scheduling Strategies for Parallel Processing
- IEEE Micro

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0158 - Cloud Computing and Service-Oriented Architecture

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Extension workload: 30 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Teach students theoretical and practical aspects concerning the development of distributed applications according to the cloud computing model, focusing on virtualization, service-oriented architectures, scheduling and programming interfaces for cloud computing.

Responsible teacher (s) (s)

1402765 - Márcio Eduardo Delamaro

Menu

Scope of cloud computing and service-oriented architectures: virtualization, SOA, Web Services, Performance Evaluation, Economical Models.

Syllabus

Scope of cloud computing and service-oriented architectures: context, motivation, goals, concepts and resources. Cloud Computing definitions: Cloud Computing general approach and its applicability for distributed applications development. Categories of cloud computing: software, platform, infrastructure as a service, and others. Service-Oriented Architecture definitions - SOA and Web Services: introduction to the architectural model, setup, configuration and development of service-oriented applications. Deployment of cloud applications. General principles and types of virtualization: introduction, characteristics and types of virtualizers, advantages and disadvantages. Resource management in the cloud: challenges and solutions that involve scheduling, provisioning and migration of resources in the cloud. Development and performance evaluation of distributed cloud applications: Tools, models and techniques for development of cloud applications. Performance evaluation in cloud environments

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work.

Evaluation criterion

Notes will be assigned to exercises and practical work performed outside class, and in the tests on the subjects of the program. The final grade will be calculated by the weighted average of these grades obtained by the student during the semester.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC >= 5; or max {np, mrec}, if mrec < 5

Basic bibliography

Livro(s) Texto(s):

-Rajkumar Buyya, James Broberg, Andrzej M. Goscinski. Cloud Computing: Principles and Paradigms, ISBN: 0470940093, 9780470940099, . Wiley, 664 pages, 2010.

Complementary bibliography

-Hwang, K., Dongarra, J., Fox, G.C. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things. ISBN: 9780128002049, Elsevier, 2013.
-David S. Linthicum. Cloud Computing and SOA Convergence in Your Enterprise: A Step-by-Step Guide, ISBN-10: 0136009220, Addison-Wesley Professional; 264 pages, 1 edition, 2009.
-Thomas Erl, Zaigham Mahmood, Ricardo Puttini. Cloud Computing: Concepts, Technology & Architecture. Prentice Hall. ISBN-10: 0133387526, 528 pages, 2013.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of Cloud Computing Application Models and Society Software Projects According to the cloud computing paradigm with infra -stress, Paltform and Software as a service in any environment (public or private).

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0160 - Modeling and Simulation of Computational Systems

Class Credits: 3

Work Credits: 2

Total workload: 105 h

Type: Semester

Activation: 01/01/2016 **Deactivation:**

Goals

The objective of the course is to introduce to students the fundamental concepts of modeling and simulation as a tool for solving problems in science in general, and in the area of specific computer science.

Menu

Topics to be studied include: deterministic and stochastic modeling, random numbers and variable generation, discrete event systems simulation, simulation development, experiment planning, workload definition, model validation and simulation results analysis. Simulation languages.

Syllabus

Modeling: Definitions, types of models, advantages and disadvantages;

Stochastic Models: Generation of uniformly distributed and statistically dependent variables, Poisson process, queue elementary models, queue networks;

Simulation: Types of simulation, discrete event systems simulation, development, model validation, results analysis, workload modeling;

Experiment Planning: Nomenclature, Planning Types.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work.

Evaluation criterion

Notes will be assigned to exercises and practical work performed outside class, and in the tests on the subjects of the program. The final grade will be calculated by the weighted average of these grades obtained by the student during the semester.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC >= 5; or max {np, mrec}, if mrec < 5

Basic bibliography

Book (s) text (s):

- Handbook of simulation: Principles, methodology, advances, applications and practice. Banks, J. Wiley, 1998.
- Computer systems performance evaluation and prediction / Paul J. Fortier, Howard E. Michel. Burlington, MA : Digital Press, c2003.
- Discrete-Event System Simulation (Fourth Edition), Banks, Carson, Nelson, and Nicol, Prentice-Hall, 2005.

Complementary bibliography

- Simulation Modeling and Analysis (Third Edition), Law and Kelton, McGraw Hill, 2000.
- Simulating Computer Systems: Techniques and Tools, M.H. MacDougall , MIT Press Series in Computer Systems, 1987
- Modeling and tools for network simulation / Klaus Wehrle, Mesut Güneðs, James Gross, editors. Berlin : Springer, 2010 New York.
- Design and analysis of simulation experiments / Jack P.C. Kleijnen. New York : Springer, c2008.
- Simulation. Sheldon M. Ross. 4th ed.
- Queueing networks and Markov chains : modeling and performance evaluation with computer science applications / Gunter Bolch ... [et al.]. 2nd ed.
- The Art of Computer Systems Performance Evaluation, Raj Jain, John Wiley and Sons, Inc., 1991.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0712 - Mobile Robots Programming

Class Credits: 2

Work Credits: 3

Total workload: 120 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Provide an overview of basic concepts related to mobile robots software and hardware. Introduce to students the most common sensors and actuators which are used on mobile robots. Study of mobile robot control architectures and control software.

Practical design, implementation and test of algorithms for robot navigation, applied to classical mobile robot tasks.

Responsible teacher (s) (s)

1402765 - Márcio Eduardo Delamaro

Menu

History and evolution of mobile robots. Description and analysis of properties of the most commonly used sensors and actuators for mobile robots. Control Architectures for mobile robots. Mobile robots: algorithms for path planning, obstacle avoidance, autonomous navigation and multiple robot cooperation. Robotic frameworks and tools: using simulators and tools for real mobile robots programming and control (e.g. Player/stage, ROS). Practical design, implementation and test of algorithms for robot navigation, using simulators and/or real robots, applied to classical mobile robots tasks and problems.

Syllabus

History and evolution of mobile robots. Description and analysis of properties of the most commonly used sensors and actuators for mobile robots. Control Architectures for mobile robots. Mobile robots: algorithms for path planning, obstacle avoidance, autonomous navigation and multiple robot cooperation. Robotic frameworks and tools: using simulators and tools for real mobile robots programming and control (e.g. Player/stage, ROS). Practical design, implementation and test of algorithms for robot navigation, using simulators and/or real robots, applied to classical mobile robots tasks and problems.

Evaluation instruments and criteria

Evaluation method

Practical work in laboratory and extra-class.

Evaluation criterion

The final grade will be calculated based on the weighted average of the practical work performed in the laboratory and extra-class.

Recovery

Nota Final: = $(NP-2) / 5 * Mrec + 7 - NP \leq Mrec \leq 5$; ou

Max (np, mrec) if mrec < 5

Being np = grade of the 1st evaluation and

MREC = Recovery Average

Basic bibliography

- Text book:
 - SEBASTIAN THRUN, WOLFRAM BURGARD, DIETER FOX, Probabilistic Robotics, MIT Press, 2005.
- Complementary bibliography:
 - ROLAND SIEGWART, ILLAH R. NOURBAKHS, Introduction to Autonomous Mobile Robots, MIT Press, 2004
 - ROBIN MURPHY, An Introduction to AI Robotics, MIT Press.
 - RONALD ARKIN, Behavior-based Robotics, MIT Press, 2001
 - Player/Stage - Software tools for robot and sensors applications, <http://playerstage.sourceforge.net/>.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Availability of didactic material

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in proposed activities. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0714 - Autonomous Mobile Robots

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Type: Semester

Activation: 15/07/2019 **Deactivation:**

Goals

Provide theoretical concepts and practical aspects related to the autonomous mobile robots field, focused into the design of robot control and navigation systems. Present design models of intelligent control and navigation systems for mobile robots and autonomous systems. The main goal is to study, design, implement and test intelligent control algorithms into simulated and real mobile robots, applied into practical tasks, as for example: mapping, path planning, navigation with obstacle avoidance, pick up and collect objects.

Responsible teacher (s) (s)

1402765 - Márcio Eduardo Delamaro

Menu

Introduce a general overview of the mobile robots field (tele-operation/tele-presence, semi-autonomous, autonomous mobile robots), presenting the history, evolution and most known techniques used in mobile robot navigation. Introduce the main concepts about components and modules that compose an autonomous mobile robot, including microprocessors, embedded systems, sensors and actuators. Concepts related to the implementation of intelligent and autonomous mobile robots: control architectures, robot design (simulation, hardware and software components), navigation concepts and algorithms. Artificial Intelligence techniques applied to mobile robots: autonomy and adaptability. Discuss examples of tasks and practical applications of mobile robots: mapping, path planning, navigation with obstacle avoidance, pick up and collect objects.

Syllabus

General overview of the mobile robots field: types of robots, types of control/autonomy, types of components. Present the history, evolution and most known techniques used in mobile robot navigation. Main concepts about components and modules that compose an autonomous mobile robot, including microprocessors, embedded systems, sensors and actuators. Intelligent mobile robots control architectures, navigation concepts and algorithms. Mobile Robots: autonomy, intelligent techniques (A.I.), and adaptability (Learning). Examples of practical applications: mapping, path planning, navigation with obstacle avoidance, pick up and collect objects.

Evaluation instruments and criteria

Evaluation method

Practical work in laboratory and extra-class.

Evaluation criterion

The final grade will be calculated based on the weighted average of the practical work performed in the laboratory and extra-class.

Recovery

The final grade will be calculated based on the weighted average of the practical work performed in the laboratory and extra-class.

Basic bibliography

Text Book:

- Computacional Principles of Mobile Robotics, Gregory Dudek, Michael Jenkin, Cambridge Press, 2000.
- The Robotics Primer, Maja J. Mataric, MIT Press, 2007.

Complementary Bibliography:

- Artificial societies: the new frontier of artificial intelligence. Bookman Publishing House 2003.
- Designing Autonomous Mobile Robots: Inside the Mind of an Intelligent Machine. Newnes; Bk&CD-Rom edition (December 15, 2003).
- Siegwart, Roland: Introduction to autonomous mobile robots. Roland Siegwart and Illah R. Nourbakhsh. Cambridge, Mass. MIT Press 2004. ix, 321 p.. ; ill. : 24 cm.
- Intelligent Mobile Robot Navigation. Springer-Verlag. First edition 2005.
- Autonomous Mobile Robots (Control Engineering). CRC Press. (May 4, 2006).
- Bräunl, Thomas: Embedded robotics: mobile robot design and applications with embedded systems. Thomas Bräunl. Berlin Springer c2008. xiv, 541 p. ; ill: 25 cm.
- Everett, H.R.: Sensors for mobile robots: theory and application. H.R. Everett. Wellesley, Mass. A.K. Peters c1995. xiv, 528 p.. ; ill. : 24 cm.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0723 - Collaborative Systems: Fundamentals and Applications

Class Credits: 2

Work Credits: 0

Total workload: 30 h

Type: Semester

Activation: 15/07/2020 **Deactivation:**

Goals

Provide the foundation for the development and implementation of collaborative systems. At the end of the course the student will be able to analyze and develop collaborative systems based on the state of the art in the field. Furthermore, we expect students to apply the concepts of collaborative systems in different situations as well as implement solutions that enable teamwork. Students will acquire skills to specify, prototype, analyze, design, implement, test and evaluate collaborative systems in real situations. Students will be equipped with the necessary knowledge to conduct scientific research within this theme.

Responsible teacher (s) (s)

1402765 - Márcio Eduardo Delamaro

Menu

Fundamentals of Collaborative Systems (Groupware, CSCW, theories and models of collaboration). Development of collaborative systems. Application of Collaborative Systems in organizational environments (society, companies, schools, etc.). Collaboration business processes. Knowledge management and organizational memory. group formation. Folksonomy. Hardware-software integration to build collaborative systems. Collaboration in mobile computing. Computer-Supported Collaborative Learning (CSCL). Collaborative systems applied to software development. Evaluation of collaborative systems. Artificial Intelligence for Collaborative Systems. Scientific research methodology in Collaborative Systems.

Syllabus

Fundamentals of Collaborative Systems (Groupware, CSCW, theories and models of collaboration). Development of collaborative systems. Application of Collaborative Systems in organizational environments (society, companies, schools, etc.). Collaboration business processes. Knowledge management and organizational memory. group formation. Folksonomy. Hardware-software integration to build collaborative systems. Collaboration in mobile computing. Computer-Supported Collaborative Learning (CSCL). Collaborative systems applied to software development. Evaluation of collaborative systems. Artificial Intelligence for Collaborative Systems. Scientific research methodology in Collaborative Systems.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work performed during the exhibition classes and in the laboratory

Evaluation criterion

Evidence, projects and exercises. The final grade will be calculated by the weighted average of the test grades, projects and exercises obtained by the student during the course.

Recovery

$(Np - 2) / 5 * mrec + 7 - np$, if $mrec > 5$
 $\max \{np, mrec\}$, if $mrec < 5$

Basic bibliography

Text Book:

Pimentel, M. & Fuks, H. Collaborative Systems, Elsevier, 2011 ISBN-13: 978-85-352-4669-8

Complementary Bibliography:

- Beyerlein, M. M., Freedman, S., McGee G., Moran, L. Beyond Teams: Building the Collaborative Organization, Pfeiffer, 2002 ISBN: 978-0-7879-6373-6
Borghoff, U.M. and Schlichter, J.H., Computer-Supported Cooperative Work: Introduction to Distributed Applications. Springer, USA, 2000. ISBN 3-540-66984-1
Greif, I. (Ed). Computer Supported Cooperative Work - A book of readings. Morgan Kaufmann Publishers, USA, 1988. ISBN 0-934613-57-5.
Carroll, J. (2011) Synthesis Lectures on Human-Centered Informatics. Morgan & Claypool Publishers ISSN: 1946-7680
Seffah, A., Vanderdonckt, J. & Desmarais, M. C. (2009) Human-Centered Software Engineering. Berlin, Heidelberg: Springer. ISBN 978-1-84800-906-6

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0725 - Software Architecture

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Type: Semester

Activation: 15/07/2017 **Deactivation:**

Goals

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Theoretical classes followed by application exercises and questions.

Evaluation criterion

Weighted average of exercise notes, tests and group work.

Recovery

Recovery proof. Approval Criteria: $NP + (MREC/2.5)$, if $MREC >= 7.5$; or $\max\{np, mrec\}$, if $mrec <= 5.0$; or 5.0, if $5.0 <= mrec < 7.5$ ($np = 1$ st evaluation, $mrec = \text{proof}$).

Basic bibliography

Livros texto

- L. Bass, P. Clements, and R. Kazman, Software Architecture in Practice. 3. Edição, Addison-Wesley, 2012.
- P. Clements, et al., Documenting Software Architectures: Views and Beyond, 2. Edição, Addison-Wesley, 2010.
- P. Clements, R. Kazman, M. H. Klein, Evaluating Software Architectures: Methods and Case Studies, Addison-Wesley, 2001.
- N. Rozanski, E. Woods, Software Systems Architecture: Working With Stakeholders Using Viewpoints and Perspectives, 1. Edição, Addison-Wesley, 2005.

Bibliografia complementar

- P. Kruchten, H. Obbink, and J. Stafford, "The past, present, and future for software architecture," IEEE Software, vol. 23, no. 2, pp. 22-30, 2006.
- M. Shaw and P. Clements, "The golden age of software architecture," IEEE Software, vol. 23, no. 2, pp. 31-39, Mar/Apr 2006.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0740 - Embedded Systems

Class Credits: 3

Work Credits: 2

Total workload: 105 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

To introduce Embedded Systems and their application areas. Integration between communication, multimedia, and processing systems including RF data (radio frequency) that continue to expand the complexity of embedded systems, highlighting existing examples. To conceptualize Distributed Embedded Systems (DES) with a large number of elements implementing different functions and considered as smart nodes working with sensors and actuators. Such features configure the increasingly complexity of the systems reflecting the current applications.

Responsible teacher (s) (s)

1842655 - Simone do Rocio Senger de Souza

Menu

Introduction to Embedded Systems; study of the main features of the computing elements of type DSP (Digital Signal Processing), FPGAs and ASICs aimed at embedded applications; a survey of the limitations and capabilities of the hardware and software of these elements for the implementation of embedded systems; methodologies to compare results between the different technologies; networks in real-time systems, message scheduling, considerations of communication event/time, impact of the physical media, network topologies and media access control.

Syllabus

Introduction to Embedded Systems; study of the main features of the computing elements of type DSP (Digital Signal Processing), FPGAs and ASICs aimed at embedded applications; a survey of the limitations and capabilities of the hardware and software of these elements for the implementation of embedded systems; methodologies to compare results between the different technologies; networks in real-time systems, message scheduling, considerations of communication event/time, impact of the physical media, network topologies and media access control.

Evaluation instruments and criteria

Evaluation method

Expository and laboratory classes using the blackboard, audio-visual resources, EDA (Electronic Design Automation) software tools and hardware development signs.

Evaluation criterion

Notes will be assigned to the monograph, exercises and work performed in the laboratory, some in class and others out of class. The final grade will be calculated by the weighted average of the students obtained by the student in the monograph, in the work and tests, during the semester.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC> = 5; or max {np, mrec}, if mrec <5

Basic bibliography

"Text book:

-NOERGAARD, T. "Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers", 656 pages, ISBN 0750677929, Newnes; 2005.

-BERGER, A.; BERGER, A.S. "Embedded Systems Design: An Introduction to Processes, Tools and Techniques", 237 pages, ISBN 1578200733, Newnes; 2001.

"Complementary Bibliography:

-BRAUNL, T. "Embedded Robotics: Mobile Robot Design and Applications with Embedded Systems", 434 pages, ISBN 3540034366, Springer; 2004.

-ROWEN, C., Engineering the Complex SoC: Fast, Flexible Design with Configurable Processors, Prentice Hall, 2004

-CATSOULIS, J. "Designing Embedded Hardware", 328 pages ISBN 0596003625, O'Reilly; 2002.

-CHENG "Operating Systems and Embedded Programming: from Vcrs and Pdas to Avionics and Sensor Networks", ISBN: 0471486019, 500 pages, John Wiley & Sons Inc, 2006.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0950 - System Software Design and Development

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Type: Semester

Activation: 15/07/2020 **Deactivation:**

Goals

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Introduction to system software, evolution, design and development of operating systems, system libraries, development of portable applications, emulators, system software debugging.

Syllabus

Conceptual foundations: introduction to system software, historic evolution and state of art. System software design: design and development of operating systems, static and dynamic programming libraries, compilers and system utilities. System software programming: tools, debugging, emulators, tests. Software portability: development of portable software, cross compilation, porting of libraries and compilers, performance and maintenance requirements. Case study: POSIX, comparisons to other standards.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work.

Evaluation criterion

Notes will be assigned to exercises and practical work performed inside and out of class about the topics addressed by the program. The final grade will be calculated by the weighted average of these grades obtained by the student during the semester.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC >= 5; or max {np, mrec}, if mrec < 5

Basic bibliography

Livros Texto:

Bach, Maurice J. The design of the UNIX operating system. Vol. 1. Englewood Cliffs, NJ: Prentice-Hall, 1986.

Bibliografia Complementar:

Loosemore, Sandra, et al. The GNU C library reference manual. Boston: Free software foundation, 2001.

Raymond, Eric S. The art of Unix programming. Addison-Wesley Professional, 2003.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0951 - Development of optimized code

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Type: Semester

Activation: 01/01/2019 **Deactivation:**

Goals

To provide a deeper knowledge on code development, focusing on performance, security and reliability requirements

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Code optimization techniques, application speedup, development of secure code, development of reliable code.

Syllabus

Code optimization techniques: techniques independent on processors, techniques dependent on processors, detection of hot spots, profiling: objectives, methodologies and tools. Application speedup: simple optimization; optimization in compiling; code vectorization; optimized libraries; optimization of data access. Development of secure code: buffer overflow prevention; prevention by string formatting; prevention by integer overflow. Development of reliable code: practice for developing reliable code.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work developed in and out of class.

Evaluation criterion

Weighted average notes in tests and works.

Recovery

$(NP -2) / 5 * MREC + 7 - NP$, if $MREC \geq 5$; or $\max\{np, mrec\}$, if $mrec < 5$

Basic bibliography

Livro Texto:

Hager, G. and Wellein, G. Introduction to High Performance Computing for Scientists and Engineers. CRC Press, Inc., Boca Raton, FL, USA. 2010.

Bryant, R. and O'Hallaron, D. R. Computer Systems: A Programmer's Perspective. Prentice Hall, Third Edition, 2015.

Viega, J; McGraw, G. Building Secure Software: How to Avoid Security Problems the Right Way. Addison-Wesley Professional. 2001

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0959 - Software Testing and Inspection

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 01/01/2022 **Deactivation:**

Goals

To provide an overview of the Verification, Validation and Testing area (VV&T), with emphasis on strategies, techniques and testing criteria and associated tools that can be used to build software.

Responsible teacher (s) (s)

1402765 - Márcio Eduardo Delamaro

1842655 - Simone do Rocio Senger de Souza

Menu

Software quality and VV&T. Terminology and basic concepts on software testing. VV&T on the software development process. Software testing techniques. Software testing strategies. Software testing planning. Software Inspection and review. Software testing automatization.

Syllabus

Software quality and VV&T. Terminology and basic concepts on software testing. VV&T on the software development process: Unit testing, integration testing, and system testing. Software testing techniques: functional testing, structural testing and fault-based testing. Regression testing. Software testing strategies. Software testing planning. Risks-based testing. Software Inspection and review. Software testing automatization: selection and test data generation tools. Software testing applied in new software domain.

Evaluation instruments and criteria

Evaluation method

Exhibition classes, exercises and practical work.

Evaluation criterion

Notes will be assigned to exercises, practical work and evidence on the subjects of the program. The final grade will be calculated by the weighted average of the grades obtained by the student during the semester.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC> = 5; or max {np, mrec}, if mrec <5

Basic bibliography

Livro Texto

- BEIZER, B. Software Testing Techniques. Van Nostrand Reinhold Company, New York, 2nd edition, 1990.
- G. J. MYERS, COREY SANDLER, TOM BADGETT, AND TODD M. THOMAS. The Art of Software Testing. John Wiley & Sons, 2nd edition, 2004.
- M. E. DELAMARO, J. C. MALDONADO, E M. JINO. Introdução ao Teste de Software. Elsevier, 1a. edição, 2007.

Bibliografia Complementar

- M. E. DELAMARO, J. C. MALDONADO, E M. JINO. Introdução ao Teste de Software. Elsevier, 2a. edição, 2016.
- Amman P, Offutt J. Introduction to Software Testing. 2a Ed, Cambridge University Press, 2016.
- Vincenzi, A. Maldonado, J. C., Delamaro, M. E. Automatização de Teste de Software com Ferramentas de Software Livre, 1a Ed, GEN LTC, 2018.
- BEIZER, B. Software System Testing and Quality Assurance, Van Nostrand Reinhold, New York, 1983.
- KANER, C. et al. Testing Computer Software, 2nd edition, Van Nostrand Reinhold, 1993.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0225 - Mobile Application Development Lab

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Type: Semester

Activation: 01/01/2018 **Deactivation:**

Goals

Provide students with a broad and applied view of the development of applications for mobile devices.

Menu

Applications in mobile devices: characteristics, platforms, architectures, development environments. Basic applications: interaction elements, storage, and communication. Integrated applications.

Syllabus

Historical overview of mobile devices and applications. Characteristics and architecture of mobile devices. Application development environments and programming languages. Operating systems for mobile devices. Interaction aspects including interface design. Accessibility resources. Development of native applications. Issues on storage and communication. Performance and security aspects. Development of basic applications comprehending elements of interaction, storage, and communication. Publishing and distribution of mobile applications. Development of an integrated application.

Evaluation instruments and criteria

Evaluation method

Evidence related to the concepts treated in the classes. Practical work done inside and outside the laboratory.

Evaluation criterion

Weighted average (NP) of evidence and works.

Recovery

Recovery Proof (MREC). Criterion: $NP + (MREC/2.5)$, if $MREC >= 7.5$; or $\max\{np, mrec\}$, if $mrec <= 5.0$; or $5.0 <= mrec < 7.5$ ($np = 1$ st evaluation, $MREC =$ recovery test).

Basic bibliography

Text Books

-PIMENTEL, MG; STRONG, RP; CUNHA, BCR; Machado Neto, O - Applications Development for Mobile Devices: Theory and Practice, 2017, Technical Report, ICMC -USP.

Complementary bibliography

- Harvey M. Deitel, Paul J. Deitel, Abbey Deitel - “Android: How to Program with Introduction to Java”. Edition 2. Publisher Group to Education. 2015.
- Lecheta, R.R. “Google Android”. Novatec Publisher. 2015.
- Lee, V - mobile applications. Architecture, Project and Development. Publisher Pearson, 2015, ISBN 978-8534615402.
- Phillips, B, Stewart, C, Marsicano, K -Android Programming: The Big Nerd Ranch Guide, Ed. Big Ranch Guides, 2017, ISBN 978-0134706054.
- Deitel, Paul; Deitel, Harvey; WALD, Alexander. Android 6 for programmers: an application -based approach. 3 ed., Porto Alegre: Bookman, 2016.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0231 - Introduction to Intelligent Systems

Class Credits: 3

Work Credits: 1

Total workload: 75 h

Type: Semester

Activation: 01/01/2011 **Deactivation:**

Goals

To provide a more detailed view of Artificial Intelligence systems emphasizing techniques and methods of knowledge acquisition and representation.

Menu

The course must present the main paradigms of machine learning applied to knowledge discovery in databases, pattern classification, and their applications.

Syllabus

Characterization of intelligent systems. Introduction to knowledge-based systems. Learning paradigms: symbolic, fuzzy, connectionist, genetic and probabilistic. Case-based reasoning. Hybrid systems. Knowledge discovery in database: data mining.

Evaluation instruments and criteria

Evaluation method

Exhibition classes and programming exercises.

Evaluation criterion

Average obtained from notes of tests and practical exercises.

Recovery

-Approval Criterium: $NP + (MREC/2.5)$, if $MREC > 7.5$; or $\max\{NP, MREC\}$, if $MREC \leq 7.5$. (NP = 1st evaluation, MREC = proof)

Basic bibliography

· Text book:

-MITCHELL, T.M. Machine Learning. McGraw-Hill 1997.

- Rezende, S.O. Smart Systems: Fundamentals and Applications. Publisher Manole, 2003.

· Complementary bibliography:

- NEBEL, B.; VON LUCK, K.. Issues of integration and balancing in hybrid knowledge representation systems. In K. Morik, ed. Proceedings of the 11th German Workshop on Artificial Intelligence, p.115-123, 1987.
- RILEY, G. Expert Systems - Principles and Programming, Second Edition, PWS Publishing Company, 1994.
- Rich, E. & Knight, K. Artificial Intelligence. McGraw Hill. 2nd edition, 1994.
- GOONATILAKE, S. & KHEBBAL, S. Intelligent Hybrid Systems: Issues, Classification and Future Direction, Intelligent Hybrid Systems, pp. 1-20, John Wiley & Sons, London, 1995.
- RUSSEL, S. & NORVIG, P. Artificial Intelligence: A Modern Approach. Prentice Hall, 1995.
- KASABOV, N.K. Foundations of Neural Networks, fuzzy Sets, Knowledge Engineering, MIT Press, 1996.
- WEISS, S. M. & INDURKIHYA, N. Predictive Data Mining Morgan Kaufmann, 1998.
- Braga, A., Carvalho A. and Ludermir T.: Artificial neural networks: theory and applications. Published by Publisher Technical and Scientific Book, Rio de Janeiro, Brazil, February 2000.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0233 - Machine Learning and Data Mining Applications

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Type: Semester

Activation: 15/07/2022 **Deactivation:**

Goals

Familiarize the students with the applications of data mining and machine learning techniques in real problems, using for such techniques and tools seen in other related courses.

Responsible teacher (s) (s)

2373891 - José Fernando Rodrigues Junior

Menu

Study, teste and evaluation of data mining and machine learning techniques for real problems.

Syllabus

Data preprocessing and model building using descriptive and predictive techniques. Performance evaluation.

Evaluation instruments and criteria

Evaluation method

Notes will be assigned to practical work and participation in discussions and seminars. The final grade will be calculated by the weighted average of the grades obtained by the student during the semester.

Evaluation criterion

Recovery

Recovery

Realization: Until the first week of later semester classes -Approval Criterium: $NP + (MREC/2.5)$, if $MREC > 0$ or $= 7.5$; or $\max\{np, mrec\}$, if $mrec \leq 5.0$; or 5.0 , if $5.0 \leq mrec < 7.5$. ($np = 1st$ evaluation, $mrec = proof$)

Basic bibliography

Alpaydin, E. (2004). Introduction to Machine Learning. MIT Press.

Mitchell, T. M. (1997). Machine Learning. McGraw-Hill.

FACELI, Katti; LORENA, Ana Carolina; GAMA, John; DE CARVALHO, A. C. P. L. F. (2011).

Artificial Intelligence – A machine learning approach. 1. Ed. Rio de Janeiro: LTC.
Flach, P. (2012). Machine Learning: The Art and Science of Algorithms that Make Sense of
Data. Cambridge University Press.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0244 - Data Mining in Large Databases

Class Credits: 3

Work Credits: 0

Total workload: 45 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Responsible teacher (s) (s)

2085191 - AGMA JUCI MACHADO TRAINA

71532 - Caetano Traina Junior

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Theoretical exposure, followed by exercises, seminars and practical work with computer use.

Evaluation criterion

Notes will be assigned to practical work and seminars, and will be proposed in the classroom. The final grade will be calculated by the weighted average of these notes.

Recovery

-Approval Criterium: NP+(MREC/2.5), if MREC or = 7.5; or max {np, mrec}, if mrec or = 5.0; or 5.0, if 5.0 or = mrec 7.5.
(NP = 1st evaluation, mrec = proof)

Basic bibliography

- Text book:
 - HAN, J.; KAMBER, M. Data Mining - Concepts and Techniques. Morgan Kaufmann Publishers, 2001. ISBN 1558604898.
 - HAND, D.J.; MANNILA, H.; SMYTH, P. Principles of Data Mining. Cambridge. MA: MIT Press, 2001.
 - WITTEN,I. H.; FRANK, E. Data Mining: Practical Machine Learning Tools and Techniques, 2nd edition. Morgan Kaufmann, 2005. ISBN 0120884070.

- Complementary bibliography:
 - FAYYAD, U.M.; PIATETSKY-SHAPIRO, G.; SMYTH, P.; UTHURUSAMY, R. *Advances in Knowledge Discovery and Data Mining*. Cambridge, MA: MIT Press, 1996. ISBN 0262560976.
 - KANTARDZIC, M.; ZURADA, J. *Next Generation of Data Mining Applications*. Wiley-IEEE Press, 2005. ISBN 0471656054.
 - Dunham, M. H. *Data Mining Introductory and Advanced Topics*. Prentice Hall/Pearson Education, 2003. ISBN 0130888923.
 - Rezende, S.O. *Smart Systems: Fundamentals and Applications*. Monole, 2003.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0252 - Computational Visualization

Class Credits: 3

Work Credits: 1

Total workload: 75 h

Type: Semester

Activation: 15/07/2023 **Deactivation:**

Goals

The objective of this course is to provide an introduction to the fields of Data Visualization and Visual Data Analysis. The goal is to present what is Data Visualization and what it is used for, introduce classical techniques and the data types and data structures that can be manipulated. Visualization techniques and different data types will be presented, as well as typical analysis tasks, illustrated in several application scenarios. We seek to present an overview that reflects the current situation in the area, as well as illustrative applications and practical examples, as well as to encourage the execution of visual data analysis tasks.

Responsible teacher (s) (s)

88433 - Maria Cristina Ferreira de Oliveira

Menu

Introduction to Data Visualization, Visual Analytics and applications. Computational representations of data. Visualization techniques and their classification. Visualization of spatial data. Visualization of abstract data. Multiple data types, image and text attributes; visual summarization; scalability issues. Applications, advances and trends.

Syllabus

Introduction: Data Visualization, Visual Data Mining and Visual Analytics; applications in science and in diverse professional activities (software, text, images, networks, censuses, medicine, biology, etc. as data sources). Visualization in Data Science and Big Data. Problems and challenges in data visualization. Data types and data organization, data pre-processing. Basic visualization techniques and their classification. Visualization of spatial data: surfaces and volumes, comparison; vector and tensor data. Abstract data visualization: projections, icons, hierarchical techniques, graph visualization, point-based visualization techniques, pixel-based techniques, axis-based and attribute-based techniques. Tasks and interaction strategies in visual data analysis. Multiple types of data, image and text attributes; visual summarization; scalability. Recent applications and advances, resources and libraries; visualization in the media.

Evaluation instruments and criteria

Evaluation method

Exhibition of concepts in theoretical classes. Examples demonstrations and development of practical examples in the classroom.

Evaluation criterion

Practical tasks of data interpretation and analysis; Development and implementation projects of algorithms for data analysis; Evidence.

Recovery

-Approval Criterium: $NP + (MREC/2.5)$, if $MREC >$ or = 7.5; or max {np, mrec}, if $mrec <$ or = 5.0; or 5.0, if 5.0 < or = mrec < 7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

Livros Texto:

Interactive Data Visualization: Foundations, Techniques, and Applications, 2nd Edition, Matthew O. Ward, Georges Grinstein, Daniel Keim, 2015, CRC Press.

Visualization Analysis & Design, Tamara Munzner, 2014, CRC Press,.

Data Visualization: Principles and Practice, Second Edition, Alexandru C. Telea, 2015. A. K Peters. The Visual

Complementar:

Display of Quantitative Information, 2nd ed., Edward R. Tufte, 2001, Graphics Pr.

Visual Thinking for Design, Colin Ware, 2013, Morgan Kaufmann

Now You See It: Simple Visualization Techniques for Quantitative Analysis, Stephen Few, Analytics Press, 2009.

Information Visualization, 1. ed., Robert Spence, 2000 ACM Press.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0254 - Introduction to Computational Geometry: algorithms and applications

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 01/01/2020 **Deactivation:**

Goals

Introduce students to concepts of computational geometry, with focus on algorithms, data structures and in applications of methods such as in computer graphics, robotics and competitive programming. The course approaches how the Computational Geometry allows to model computer graphic problems, as well as presenting practical aspects of algorithm implementation often studied in programming contests.

Menu

Basic concepts. Polygon triangulation and partitioning, 2D and 3D convex hulls. Arrangements. Proximity theorems: Voronoi diagrams and Delaunay triangulation. Geometric search. Random Sampling. Design of programming libraries for points, circles, triangles and quadrilaterals.

Syllabus

Basic geometric concepts such as duality, computational models and lower bounds. Convex Hull: properties and algorithms. Arrangements: combinatorial and arrangements, the zone theorem, sweep algorithms, Davenport-Schinzel sequences. Proximity problems: Voronoi diagrams and Delaunay triangulation. Geometric searching: point location in collections of hypersurfaces, fractional cascading. Random sampling. Minimal distances and visibility problems. Robot motion planning: sums of Minkowski, cell decomposition, movement with 2 and 3 degrees of freedom. Competitive programming problems: design of programming libraries for points, circles, triangles and quadrilaterals

Evaluation instruments and criteria

Evaluation method

Theoretical exhibition classes and practical work related to the areas of computer graphics and/or robotics. Problem solving competitive programming with automatic correction.

Evaluation criterion

Evaluation through written tests, practical work related to the areas of computer graphics, robotics and competitive programming. Number of tests: at least one (01) and a maximum of three (03) tests.

Recovery

Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

- $mf = 5$ if $5 \leq mr \leq (10 - ms)$
- $mf = (ms + mr) / 2$ if $mr > (10 - ms)$
- $mf = ms$ if $mr < 5$

Basic bibliography

Livros Textos:

- DE BERG, M; CHEONG, O.; VAN KREVELD, M.; OVERMARS, M. Computational Geometry: Algorithms and Applications. 3.ed, Springer. 2008.
HALIM, S; HALIM, Felix. Competitive Programming 3. The new lower bound of programming contests. ICPC, 2013.
VINCE, J. Geometry for Computer Graphics: Formulae, Examples and Proofs. Springer, 2005.

Bibliografia Complementar:

- SKIENA, S.S.; REVILLA, M.A. Programming Challenges: The Programming Contest Training Manual. Springer, 2003.
MULMULEY, K. Computacional geometry: an introduction through randomized algorithms, Prentice Hall, 1994.
PREPARATA, F.P.; SHANVOS, M.I. Computational geometry: an introduction, Springer, 2 ed, 1988.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0271 - Introduction to Bioinformatics

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 15/07/2022 **Deactivation:**

Goals

Introduce students to the techniques, theories and models used in Bioinformatics, allowing the development of models, tools and computer applications involving the application of Computing to solve problems in biology and medicine, as well as to perform research in the area.

Responsible teacher (s) (s)

2373891 - José Fernando Rodrigues Junior

Menu

To provide to students interested in the area, an overview of typical problems and solutions relevant in Bioinformatics.

Syllabus

Review and analysis of molecular biology sequences. Ontologies in Bioinformatics, Annotation, Gene Ontology. Gene Recognition. Sequence Alignment. Variation within and between species. Natural Selection at Molecular Level. Phylogenetic Analysis. Comparison of Genomes. Analysis of Gene Expression. Identification of regulatory sequences. Repositories and Tools Available on the Web

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work, some performed in class and others out of class. The final grade will be calculated by the weighted average of these various grades obtained by the student throughout the semester.

Evaluation criterion

Notes will be assigned to tests and/or practical work. The final grade will be calculated by the weighted average of the grades obtained by the student during the semester.

Recovery

-Approval Criterium: NP+(MREC/2.5), if MREC > or = 7.5; or max {np, mrec}, if mrec < or = 5.0; or 5.0 < or = mrec < 7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

- Text book:
 - Nello Cristianini, N.; Hahn, M. *Introduction to Computational Genomics: A Case Studies Approach* , Cambridge, 2007.
- Complementary bibliography:
 - Jones, J.; Pevzner:, P. *An Introduction to Bioinformatics Algorithms* , MIT Press, 2004.
 - Setubal J. C.; Meidanis J. "Introduction to Computational Molecular Biology", Brooks/Cole Pub Co, 1997.
 - Gloss, A. *Introdução and Bioinformática*, Artmed, 2007.
 - Wu, C.; McLarty, J. *Neural Networks and Genome Informatics* , Elsevier, 2000.
 - Jagota, A. "Data Analysis and Classification for Bioinformatics", *Bioinformatics By The Bay* Press, 2000.
 - Mount, D. "Bioinformatics: Sequence and Genome Analysis", Cold Spring Harbor Laboratory, 2001.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0273 - Intelligent Mobile Robots

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 15/07/2022 **Deactivation:**

Goals

The main objective is to introduce to the students concepts of intelligent robotics, presenting some of the most important intelligent control techniques and their efficiency, when they are applied adequately, future perspectives and applications in Mobile Robotics.

Responsible teacher (s) (s)

2373891 - José Fernando Rodrigues Junior

Menu

Presentation of intelligent techniques utilized for controlling mobile robots aiming the navigation in indoor environments and Applications.

Syllabus

Introduction to Bio-inspired algorithms, Potential Fields and modifications, Q-learning algorithm. Control of multiple robots with application to robots soccer. The USPDroids Team. Human-Robot Interactions. Humanoids: a case study: the robot NAO. Applications using simulators and real robots.

Evaluation instruments and criteria

Evaluation method

Practical work in laboratory and extra-class.

Evaluation criterion

The final grade will be calculated based on the weighted average of the practical work performed in the laboratory and extra-class.

Recovery

Realization: Until the first week of later semester classes -Approval Criterium: $NP + (MREC/2.5)$, if $MREC >$ or = 7.5; or max {np, mrec}, if mrec < or = 5.0; or 5.0, if 5.0 < or = mrec < 7.5. (np = 1st evaluation, mrec = proof)

Basic bibliography

- Text book:
 - Arkin, R. C., Behavior-based robots , MIT Press, 1998.
 - RIBEIRO, C.; REALI, A. and Romero, R., Intelligent Mobile Robots: Principles and Techniques, Book Chapter of the I Journey of Update on Artificial Intelligence - JAIA 2001, Proceedings of the XXI SBC Congress, vol. 3, pp.257-306, 2001.
- Complementary bibliography:
 - SEBASTIAN THRUN, WOLFRAM BURGARD, DIETER FOX, Probabilistic Robotics, MIT Press, 2005.
 - ROBIN MURPHY, An Introduction to AI Robotics, MIT Press.
 - ROLAND SIEGWART, ILLAH R. NOURBAKHSH, Introduction to Autonomous Mobile Robots, MIT Press, 2004.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0275 - Introduction to Data Science

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Responsible teacher (s) (s)

5890222 - Diego Furtado Silva

55735 - Roseli Aparecida Francelin Romero

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Exercises and practical work inside and outside the class. Practical classes using microcomputer simulations. Seminars for discussion of results obtained in the applications. Participation of practical classes and seminars. Practical work extraclasses. Minister seminars.

Evaluation criterion

Notes will be assigned to practical work and participation in discussions and seminars. The final grade will be calculated by the weighted average of the grades obtained by the student during the semester.

Recovery

Approval Criteria: NP + (MREC/2.5), if MREC > or = 7.5; or max {np, mrec}, if mrec < or = 5.0; or 5.0, if 5.0 < or = mrec < 7.5.
(np = 1st evaluation, mrec = proof)

Basic bibliography

Stuart Russell; Peter Norvig. Artificial Intelligence: A Modern Approach, Pearson Education Limited; 4^a edition, 2021.
Katti Faceli, Ana Carolina Lorena, João Gama, Thiago Agostinho de Almeida, André C.P.L.F.

de Carvalho, Inteligência Artificial - Uma Abordagem de Aprendizado de Máquina, LTC; 2^a edição, 2021.
Provost, F.; Fawcett, T. Data Science for Business: What you need to know about data mining and data-analytic thinking by O'Reilly Media, 2013.
Han, J.; Kamber, M.; Pei, J. Data Mining: Concepts and Techniques, Third Edition (The Morgan Kaufmann Series in Data Management Systems). Morgan Kaufmann , 2011.
Witten, I.; Frank, E. Third Edition (The Morgan Kaufmann Series in Data Management Systems). 2011.
Tan, P.-N.; Steinbach, M.; Kumar, T. Introduction to Data Mining. Addison Wesley, 2005.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Conducting practical work in topics of interest to society, for example, dealing with recent census population data, studying climate change patterns according to historical records, etc. Video production and lectures on the subject.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0277 - Data Science Competitions

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Type: Semester

Activation: 15/07/2017 **Deactivation:**

Goals

Responsible teacher (s) (s)

55735 - Roseli Aparecida Francelin Romero

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Exercises and practical work inside and outside the class. Practical classes using microcomputer simulations. Seminars for discussion of results obtained in the applications. The student must participate in the practical and seminars classes. Participation in international competitions to solve machine learning problems and data mining. Practical work extraclas. Minister seminars.

Evaluation criterion

Notes will be assigned to practical work and participation in discussions and seminars. The final grade will be calculated by the weighted average of the grades obtained by the student during the semester.

Recovery

Approval Criteria: $NP + (MREC/2.5)$, if $MREC > 0$ or = 7.5; or $\max\{NP, MREC\}$, if $MREC < 0$ or = 5.0; or 5.0, if $5.0 < MREC < 7.5$.
(NP = 1st evaluation, MREC = proof)

Basic bibliography

Alpaydin, E. (2004). Introduction to Machine Learning. MIT Press.

Mitchell, T. M. (1997). Machine Learning. McGraw-Hill.

Faceli, Katti; Lorena, Ana Carolina; Gama, João ; de Carvalho, A. C. P. L. F. (2011). Inteligência Artificial – Uma Abordagem de Aprendizado de Máquina. 1. ed. Rio de Janeiro:

LTC.

Flach, P. (2012). Machine Learning: The Art and Science of Algorithms that Make Sense of Data. Cambridge University Press.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0280 - Accessibility in Computer Systems

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Extension workload: 15 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Responsible teacher (s) (s)

6346511 - Kamila Rios da Hora Rodrigues

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Theoretical classes, accompanied by practical work and case studies inside and outside the classroom.

Evaluation criterion

Weighted average of tests and practical work performed during the course.

Recovery

Recovery proof. Approval Criteria: $NP + (MREC/2.5)$, if $MREC \geq 7.5$; or $\max\{NP, MREC\}$, if $MREC \leq 5.0$; or 5.0, if $5.0 \leq MREC < 7.5$ ($NP = 1^{\text{st}}$ evaluation, $MREC = proof$).

Basic bibliography

Text Books

- Freire, A. P.; LARA, S. M. A.; Fortes, R. P. M.. Evaluation of accessibility of websites by users with disabilities. In: José Maria N. David; Luciana C. de Castro Salgado. (Org.). Tutorials of the X Brazilian Symposium on Collaborative Systems and XII Brazilian Symposium on Human Factors in Computer Systems. 1ed. Manaus: Brazilian Computer Society, 2013, v. 1, p. 31-64.
- Fortes, R P M; LARA, S M A; FREIRE, P; PANSANATO, L T E. Accessibility in Web Applications Project. Poços de Caldas, SBC, 2005. Chap. 7, p. 197-225. In: Teixeira, A

C; Barrére, and; ABRÃO, I C, Eds. Web and Multimedia: Challenges and Solutions, Poços de Caldas: SBC, 2005
- Fortes, R P M; LARA, S M A; PANSANATO, L T E; FREIRE, P. Universalization of access to educational content in web applications. Juiz de Fora, Edit, 2005. Chap. 2, p. 21-40. , Brazilian Symposium on Informatics in Education (16.: 2005: Juiz de Fora) .. Mini Courses, Juiz de Fora: Edit, 2005.

Complementary bibliography

- Articles of the ACM Sigaccess Conference Conference on Computers and Accessibility, ACM Press
 - Articles of International Cross-Disciplinary Conference on Web Accessibility (W4A), ACM Press.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of a web project or mobile by designing resource implementation to meet the interface accessibility requirement. Proposal of courses and lectures on the good practices learned in the discipline. Provision of online material to other students and professionals in the field.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0283 - Introduction to Semantic Web

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 15/07/2023 **Deactivation:**

Goals

Introduce students to techniques, theories and models used in the Semantic Web, making them able to develop resources, tools and computer applications involving the application of the learned knowledge in the resolution of problems in the web applications field. To enable students to critically discuss relevant topics in the field and provide them with support for research development.

Responsible teacher (s) (s)

2803743 - Dilvan de Abreu Moreira

55735 - Roseli Aparecida Francelin Romero

Menu

Linked Data and RDF: 1. Semantic Web 2. RDF and RDFS 3. Linked Data: Concepts and SPARQL. 4. Ontologies, Description Logic and OWL - Web Ontology Language. 5. OWL Profiles: OWL-EL, OWL-QL and OWL-RL 6. Applications: Creating an ontology and using classifiers (sugestion Protégé) 7. Shapes Constraint Language and SWRL - Semantic Web Rule Language

Syllabus

Linked Data and RDF: 1. Semantic Web: Definition and Goals. 2. RDF and RDFS: The concept of Triples. 3. Linked Data: Concepts, SPARQL Language and Triplestores. 4. Ontologies, Description Logics and OWL - Web Ontology Language. 5. OWL Profiles: OWL-EL, OWL-QL and OWL-RL 6. Applications: Creating an ontology and using classifiers (sugestion Protégé) 7. Shapes Constraint Language and SWRL - Semantic Web Rule Language

Evaluation instruments and criteria

Evaluation method

Theoretical classes, accompanied by practical work and case studies inside and outside the classroom.

Evaluation criterion

Weighted average of tests and practical work performed during the course.

Recovery

Recovery proof. Approval Criteria: NP+(MREC/2.5), if MREC> = 7.5; or max {np, mrec}, if mrec <= 5.0; or 5.0, if 5.0 <= mrec <7.5 (np = 1st evaluation, mrec = proof).

Basic bibliography

Livros texto

Semantic Web for the working ontologist : effective modeling in RDFS and OWL / Dean Allemang, Jim Hendler. - 2nd ed. 2011 Elsevier Inc., ISBN 978-0-12-385965-5 The MIT Press. London. ISBN: 978-0262012423.

Pascal Hitzler and Markus Krötzsch and Sebastian Rudolph, Foundations of Semantic Web Technologies, 2009, Chapman & Hall/CRC.

Bob DuCharm, Learning SPARQL, O'Reilly 2011, ISBN 978-1-449-30659-5.

Seiji Isotani e Ig Ibért Bittencourt, Dados Abertos Conectados, 2015, Novatec. ISBN 978-85-7522-449-6

Bibliografia complementar

Baader, Franz, Diego Calvanese, Deborah McGuinness, Daniele Nardi, and Peter Patel-Schneider, eds. The Description Logic Handbook: Theory, Implementation and Applications. Cambridge University Press, 2003, ISBN 0521781760.

Breitman, K. K. ; Casanova, M. A.; Truszkowski, Walt .(2007) Semantic Web: Concepts, Technologies and Applications – NASA Monographs in Systems and Software Engineering Series. 1. ed. London: Springer Verlag London, 329 p Artigos de periódicos e conferências da área.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0287 - Unstructured Data Mining

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Responsible teacher (s) (s)

5373016 - RICARDO MARCONDES MARCACINI

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Theoretical classes, accompanied by practical work and case studies within the classroom.

Evaluation criterion

Weighted average of tests and practical work performed during the course.

Recovery

Recovery proof. Approval Criteria: $NP + (MREC/2.5)$, if $MREC \geq 7.5$; or $\max\{NP, MREC\}$, if $MREC \leq 5.0$; or 5.0, if $5.0 \leq MREC < 7.5$ ($NP = 1^{\text{st}}$ evaluation, $MREC = \text{proof}$).

Basic bibliography

Livros texto

- Mitchell, T. M. (1997). Machine Learning. McGraw-Hill.
- Alpaydin, E. (2004). Introduction to Machine Learning. MIT Press.
- Sholom M. Weiss, S.M.; Indurkhya, N.; Zhang, T.; Damerau, F. (2005) Text Mining: Predictive Methods for Analyzing Unstructured Information, Springer.
- Bishop, C. M. (2006). Pattern Recognition and Machine Learning. Springer.
- Feldman, R. e Sanger, J. (2007). The Text Mining Handbook: Advanced Approaches in

- Analyzing Unstructured Data. Cambridge University Press.
- Berry, M., Castellanos, M., for Industrial, S., e Mathematics, A. (2007). Survey of text mining II: clustering, classification, and retrieval. Number v. 2. Springer.
 - Berry, M. e Kogan, J. (2010). Text Mining: Applications and Theory. John Wiley & Sons.
 - Kumar, V. (2010) Temporal Data Mining (Chapman & Hall/CRC Data Mining and Knowledge Discovery Series), CRC Press.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of unruly data mining projects from open government data, data portals from municipal, state and federal agencies; aiming at monitoring, transparency and social control.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0911 - Advanced Topics in Computer Science II

Class Credits: 3

Work Credits: 2

Total workload: 105 h

Type: Semester

Activation: 15/07/2019 **Deactivation:**

Goals

Introduce students to more advanced topics in Computer Science, including theory and practice.

Responsible teacher (s) (s)

793065 - John of the Holy Spirit Batista Neto

2373891 - José Fernando Rodrigues Junior

2084609 - Maria da Graça Campos Pimentel

Menu

Topics that are not part of the subject grid, nor of the list of elective subjects

Syllabus

Presentation of the motivation behind the theme of the discipline. Implications in the universe of Computer Science. Theory that underlies the theme and its ramifications. Application examples. Theoretical and/or practical project.

Evaluation instruments and criteria

Evaluation method

Evidence, works, exercises and seminars related to the concepts treated in the classes.

Evaluation criterion

NP = Weighted average of the test notes, works, exercises, and seminars, at the teacher's discretion.

Recovery

NP+(MREC/2.5), if MREC >= 7.5; or max {np, mrec}, if mrec <= 5.0; or 5.0, if 5.0 <= mrec < 7.5 (NP = 1st evaluation, MREC = Recovery Test Note).

Basic bibliography

BROOKSEHAR, J. G .. Computer Science. A comprehensive view. 11th. Edition, Bookman, 2013.

CARVALHO, A.C.P.L.F., LORENA, A.C.; Introduction to computing. Hardware, software and data. LTC Publishing House, 2017.

FEDELI, R.D.; Introduction to Computer Science. 2nd. Edition. Cengage Publisher, 2009.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SME0808 - Time Series Analysis and Dynamical Learning

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2020 **Deactivation:**

Goals

Present basic concepts about the theory on the statistical treatment of time series data. Prepare the student for the analysis, identification and prediction of a time series.

Responsible teacher (s) (s)

57696 - Marinho Gomes de Andrade Filho

Menu

Smoothing methods. The Box and Jenkins methodology. Indexing similarity/dissimilarity, clustering, clustering coefficient, summarization, segmentation. Structural models: Bayesian state space and prediction.

Syllabus

1. Time series: concepts, smoothing, trend, seasonality and exponential smoothing. 2. Stationary processes. 3. Autocovariance and autocorrelation functions. 4. Models: ARMA, ARIMA, SARIMA. 5. Identification. 6. Estimation. 7. Forecast. 8. Diagnostics. 9. Indexing similarity/dissimilarity, clustering, summarization, segmentation. 10. Structural models: Bayesian state space and forecast.

Evaluation instruments and criteria

Evaluation method

Theoretical exposure with a view to the objectives of the subject, followed by exercises and practical work inside and outside the class.

Evaluation criterion

Weighted average of the tests.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests. Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

$Mf = 5 \text{ if } 5 \leq mr \leq (10 - ms)$
 $Mf = (ms + mr) / 2 \text{ if } mr > (10 - ms)$
 $Mf = ms \text{ if } mr < 5$

Basic bibliography

Livros Texto:

- Raquel Prado and Mike West - Time series, modelling, computations and inference. Chapman & Hall/CRC, 2010
- MORETTIN, P.A.; TOLOI, C.M.C. Análise de Séries Temporais. Blucher, 2004.

Bibliografia Complementar:

- CHATFIELD, C. "The Analysis of Time Series". 5th ed., Chapman & Hall, 1996.
- BROCKWELL, P.J.; DAVIS, R.A. "Introduction to Time Series and Forecasting". Springer-Verlag, 1996.
- BOX, J.; JENKINS, G.M; REISEL, G.C; Ljung, G.M. "Time series analysis: Forecasting and Control". Prentice-Hall, 5th Ed. 2015.
- Maimon, Oded, Rokach, Lior (Eds.) Data Mining and Knowledge Discovery Handbook, Springer, 2010.
- Montgomery, D.C.; Jennings, C.L.; Kulahci, M. Introduction to Time Series Analysis and Forecasting-Wiley (2015) .

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SME0822 - Multivariate Analysis and Unsupervised Learning

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2020 **Deactivation:**

Goals

Presentation of some methods for analyzing multivariate data.

Responsible teacher (s) (s)

3455521 - Cybele Maria Russo Novelli

Menu

Inference to multivariate distributions, size reduction techniques and cluster analysis.

Syllabus

Random vectors. Sample mean vector and sample covariance matrix. Visualization of multivariate data. The multivariate normal distribution and checking multivariate normality. Multivariate analysis of variance. Dimensionality reduction techniques: principal components analysis, factor analysis, canonical correlation analysis and correspondence analysis. Cluster Analysis: K-Means and hierarchical clustering techniques.

Evaluation instruments and criteria

Evaluation method

Theoretical exposure with a view to the objectives of the subject, followed by exercises and practical work inside and outside the class.

Evaluation criterion

Weighted average of the tests.

Recovery

RN, at least one (01) and a maximum of two (02) evidence.

Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

$$MF = 5 \text{ se } 5 \leq MR \leq (10 - MS)$$

$$MF = (MS + MR) / 2 \text{ se } MR > (10 - MS)$$

$$MF = MS \text{ se } MR < 5$$

Basic bibliography

Livro Texto:

- Friedman, J., Hastie, T., & Tibshirani, R. (2001). *The elements of statistical learning*. New York, NY, USA:: Springer Series in Statistics.
- James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). *An introduction to statistical learning (with applications in R)*. New York: springer.
- Johnson, R. A. and Wichern, D. W. *Applied Multivariate Statistical Analysis*. 5th edition. Prentice-Hall

Bibliografia Complementar:

- Chatfield, C., & Collins, A.J, 1980. *Introduction to multivariate analysis*. Chapman&Hall/CRC.
- Géron, A. (2017). *Hands-on machine learning with Scikit-Learn and TensorFlow: concepts, tools, and techniques to build intelligent systems*. O'Reilly Media, Inc..
- Mardia, K. V., Kent, J. T. and Bibby, J. M. (1979). *Multivariate Analysis*. Academic Press.
- Hair, J. F., Tatham, R. L., Anderson, R. E. and Black, W. (1998). *Multivariate Data Analysis*, 5th edition, Prentice Hall.
- Greenacre, M. J. (1984). *Theory and Applications of Correspondence Analysis*. London: Academic Press.
- Mingoti, S. A. (2005). *Análise de Dados Através de Métodos de Estatística Multivariada: Uma Abordagem Aplicada*. Belo Horizonte: UFMG

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SME0823 - Regression Models and Supervised Learning II

Class Credits: 4

Work Credits: 1

Total workload: 90 h

Type: Semester

Activation: 01/01/2020 **Deactivation:**

Goals

Present introductory concepts of generalized linear models in a computational approach.

Responsible teacher (s) (s)

3455521 - Cybele Maria Russo Novelli

Menu

Generalized linear models. Methods of estimation. Hypothesis testing. Diagnostic techniques.

Syllabus

Supervised versus Unsupervised Learning. Generalized linear models: Definition. Deviance function. Methods of estimation. Hypothesis testing. Diagnostic techniques. Applications: Generalized linear models versus Classification. Logistic Regression: Classical methods. Linear Logistic regression. Dose-response models. Diagnostic techniques. Selection model. Applications. Poisson regression: Classical methods. Log-linear Models. Classification of Models. Multiple Logistic Regression. Applications. Quasi-likelihood methods: Definition. Estimation and tests. Applications. Evaluation of the predictive capacity of the models. Bias-variance trade-off.

Evaluation instruments and criteria

Evaluation method

Theoretical exposure with a view to the objectives of the subject, followed by exercises and practical work inside and outside the class.

Evaluation criterion

Evaluation through written tests, works and seminars.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests. Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

$Mf = 5 \text{ if } 5 \leq mr \leq (10 - ms)$
 $Mf = (ms + mr) / 2 \text{ if } mr > (10 - ms)$
 $Mf = ms \text{ if } mr < 5$

Basic bibliography

Livro Texto:

- Paula, G. A. (2004). Modelos de Regressão com Apoio Computacional. IME/USP
- James, G.; Witten, D.; Hastie, T.; Tibshirani, R. (2013) An Introduction to Statistical Learning, Springer: New York.

Bibliografia Complementar:

- McCullagh, P. and Nelder, J.A. (1989). Generalized linear models, second Edition. London: Chapman and Hall.
- Collet, D. (2002). Modelling binary data. 2nd Edition, London: Chapman and Hall.
- Demetrio, C. G. B. (2002). Modelos Lineares Generalizados em Experimentação Agronômica. ESALQ/USP.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0123 - Special Topics in Software Engineering

Class Credits: 3

Work Credits: 0

Total workload: 45 h

Type: Semester

Activation: 01/01/2009 **Deactivation:**

Goals

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work, inside and out of class. Practice of the use of the methods presented, through exercises and dissertative works.

Evaluation criterion

Notes will be assigned to practical exercises and work, some in class and others out of class. The final grade will be calculated by the weighted average

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC >= 5; or max {np, mrec}, if mrec < 5

Basic bibliography

• Book (s) text (s):

- PRESSMAN,R.S. Software Engineering: - A Practitioner's Approach. 4th Edition, McGraw Hill, USA, 1997.
- SOMMERVILLE,I Software Engineering, 5^a edição, Addison-Wesley, 1995.
- VON MAYRHAUSEr, A. Software engineering: methods and management, Academic Press, 1990.

• Complementary bibliography:

- FAIRLEY,R.E. Software Engineering Concepts, New York, McGraw-Hill, 1985 (364p).
- GHEZZI,C.; JAZAYERI,M.; MANDRIOLI,D. Fundamentals of Software Engineering, Prentice Hall, 1991.
- Reviews and annals of congresses in the area.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0128 - Project Management

Class Credits: 3

Work Credits: 1

Total workload: 75 h

Extension workload: 15 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Presenting knowledge, skills and techniques used to manage a project throughout its lifecycle. Providing the student with a practical project experience in order to develop skills and competences required to apply the techniques and methods in the context of project management.

Responsible teacher (s) (s)

1842655 - Simone do Rocio Senger de Souza

Menu

Fundamental concepts in project management. Project Management Lifecycle. Project management knowledge areas. Overview over the main techniques and tools for each knowledge area in project management. Practical experience with software project management.

Syllabus

Fundamental concepts in project management: definitions of project, program, and portfolio management. Project management processes and software processes. Project management lifecycle: initiation, planning, monitoring and control, and closure. Knowledge management areas: project integration Management, project scope management, project time management, project cost management, project quality management, project human resources management, project communication management, project risk management, project procurement management. Overview of the main techniques and tools for managing each project knowledge area. Practical experience with software project management.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work performed during the exhibition classes

Evaluation criterion

Notes will be assigned to practical exercises and work, some in class and others out of class. The final grade will be calculated by the weighted average of the students obtained by the student in the work and tests, during the semester.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC >= 5; or max {np, mrec}, if mrec <5

Basic bibliography

Text Book:

-Project Management Institute (2009). A Knowledge Guide in Project Management PMBOK GUIDE 4th Edition.

Complementary Bibliography:

- Carvalho, M. M. de and Rabechini Jr., R. (2008). Building competences to manage projects. 2nd edition. Sao Paulo: Atlas Publisher.
- Gi, J. E. CLEMENTS, J. P. Project Management. Translation of the 3rd North American edition. Sao Paulo: Thomson Learning, 2007.
- Trentim, M. H. (2010). Project Management: Guide for CAPM and PMP certifications. Sao Paulo: Atlas Publisher.
- Vargas, R. V. (2009). Project Management: Establishing competitive differentials. 7th edition. Rio de Janeiro: Brasport Publisher.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Documentation of examples of projects in which solutions related to project management are prepared, for use by other students from various courses related to computing.

Activity evaluation indicators

Evaluation of the activities developed by the participating community. Evaluation of receptivity and community participation in proposed activities.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0152 - Network Management and Administration

Class Credits: 3

Work Credits: 2

Total workload: 105 h

Extension workload: 30 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Training students in aspects of specification, installation, systems administration and computer network services.

Responsible teacher (s) (s)

1842655 - Simone do Rocio Senger de Souza

Menu

Network management, use of programs and tool for management and configuration of the main network services.

Syllabus

Revisions of network concepts: IP Routing; TCP/IP (packets transmission, sockets) and connectivity (cables and network equipment). Installation and configuration of: Mount Router IP, Web Server, Windows Network Integration and TCP/IP, DNS Servers, Mail Server, Firewall: iptables, ipchains, Proxy Server, VPN (Virtual Private Network); NFS (Network File System); SNMP: network monitoring.

Evaluation instruments and criteria

Evaluation method

Exhibition classes and laboratory practices.

Evaluation criterion

Weighted average notes in tests, works and seminars.

Recovery

$(NP - 2) / 5 * MREC + 7 - NP$, if $MREC >= 5$; or $\max \{np, mrec\}$, if $mrec < 5$

Basic bibliography

• Livro(s) Texto(s):

-Craig Hunt, - TCP/IP Network Administration, O'Reilly & Associates, 2nd. Ed., 1997

• Complementary bibliography:

- COMER, D. Internetworking with TCP/IP, V. 1, Prentice Hall, 1992
- COMER, D. Computer and Networks, Prentice Hall, 1997.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of proposals and elements that may advise on the administration of computer networks.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0159 - Advanced topics on High Performance Computing

Class Credits: 3

Work Credits: 0

Total workload: 45 h

Type: Semester

Activation: 01/01/2016 **Deactivation:**

Goals

Teach students advanced topics on high-performance computing, considering advanced parallel architectures and tools for the development of concurrent programs. Relate theoretical and practical aspects concerning the development of parallel applications with quality and performance.

Menu

Scope of high-performance computing. Advanced parallel architectures. Advanced topics on concurrent software. High-performance application development. Validation, verification and testing in the context of high-performance computing.

Syllabus

Scope of high-performance computing: context, motivation, goals, concepts and resources. Advanced parallel architectures: CPU & memory organization and architecture, interconnection networks and performance evaluation of parallel architectures.

Advanced topics on concurrent software: high-performance application development employing advanced concurrent programming techniques, simultaneous use varying communication and process synchronization paradigms, software tools for development of high-performance applications and performance evaluation of such applications. Test of concurrent programs: typical defects in concurrent programs, how to employ test techniques in concurrent programs, the non-determinism problem, generation of different synchronization sequences, execution of test sessions using test tools for concurrent programs.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work.

Evaluation criterion

Notes will be assigned to exercises and practical work performed outside class, and in the tests on the subjects of the program. The final grade will be calculated by the weighted average of these grades obtained by the student during the semester.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC> = 5; or max {np, mrec}, if mrec <5

Basic bibliography

Book (s) text (s):

- PACHECO, P.S. An introduction to parallel programming. Morgan Kaufmann. Elsevier Science, 2011. ISBN: 978-0-12-374260-5
- RAUBER, T.; RÜNGER, G. Parallel programming: for multicore and cluster systems. Springer, 2010. ISBN-10: 364204817X ou ISBN-13: 978-3642048173.
- GRAMA, A.; KUMAR, U.; GUPTA,A.; KARYPIS, G. Introduction to Parallel Computing, 2nd Edition, 2003, ISBN: 0201648652.

Complementary bibliography

- STALLINGS, W. Computer Organization and Architecture, 9th ed, Prentice-Hall, Inc., 2012. ISBN-13: 978-0132936330 ISBN-10: 013293633X
- PATTERSON, D.; HENNESSY, J. Computer Organization and Design: the hardware/software interface, 5th ed., Morgan KaufmannPrint Book, 2013. Book ISBN :9780124077263 eBook ISBN 9780124078864
- Delamaro, M. E.; MALDONADO, J. C.; JINO, M. (Organizers) Introduction to Software Test. ISBN 9788535226348, Campus Publisher, 2007
- QUINN, M.J. Parallel Programming in C with MPI and OpenMP, McGraw-Hill, Published 2003, ISBN: 0072822562.
- SCOTT, L.R.; BAGHERI, B., Scientific Parallel Computing, 2005, Princeton University Press.
- LASTOVETSKY, A.L. Parallel Computing on Heterogeneous Networks, 2003.
- DONGARRA, J., et al Sourcebook of Parallel Computing, Morgan Kaufmann, John Wiley Sons, 2002, ISBN: 1558608710.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0643 - Computer Systems Performance Evaluation

Class Credits: 3

Work Credits: 1

Total workload: 75 h

Type: Semester

Activation: 01/01/2011 **Deactivation:**

Goals

Study and application of different modeling techniques and tools for performance evaluation of computational systems.

Menu

Performance metrics: user and system oriented; measuring techniques: hardware and software monitor, benchmark, prototype; stochastic processes, modeling techniques: model representation, analytical solution, simulation; case studies.

Syllabus

Performance metrics: user and system oriented; measuring techniques: hardware and software monitor, benchmark, prototype; stochastic processes, modeling techniques: model representation, analytical solution, simulation; case studies.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work developed in and out of class. Seminars.

Evaluation criterion

Notes will be assigned to work, tests and seminars developed during the semester. The grade will be calculated by the weighted average of the students obtained by the student during the semester.

Recovery

Nota Final: = $(NP-2) / 5 * Mrec + 7 - NP \leq Mrec \leq 5$; ou

Max (np, mrec) if mrec < 5

Being np = grade of the 1st evaluation and

MREC = Recovery Average

Basic bibliography

Text Book:

JAIN, J., The art of Computer Systems Performance Analysis, John Wiley & Sons, Inc., 1996.

Complementary Bibliography:

- SANTANA, M.J., SANTANA, R.H.C., FRENCH, C.R.L., EVALUATION AND PERFORMANCE ANALYSIS OF COMPUTER SYSTEMS: TECHNIQUES AND TOOLS, INTERNAL PUBLICATION ICMC - USP, 1997.
- MENASCE, D.A.; ALMEIDA, V.A.F., Capacity Planning for web Services: Metrics, Models, and Methods, Prentice Hall, 2001.
- FORTIER, P. MICHEL, HOWARD, Computer Systems Performance Evaluation and Prediction, First Ediditon (Paperback), Digital Press 2003.
- MENASCE, D.A.; DOWDY, L.W.; ALMEIDA, V.A.F., Performance by Design: Capacity Planning by Example (Paperback), 2004, Prentice Hall, ISBN 0-13-090673-5.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0713 - Evolutionary systems applyied to robotics

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Extension workload: 10 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Introduce basic concepts of evolutionary systems and their applications in real world problems with an emphasis on robotics. Develop skills in modeling systems of different complexity level where robotics can be applied as engineering, biological and social systems. The course aims to develop in the students the ability to build efficient solutions for complex problems in robotics as well as in related areas.

Responsible teacher (s) (s)

1402765 - Márcio Eduardo Delamaro

Menu

Introduction to systemic view. Major evolutionary algorithms in the literature. Real-world and robotic applications.

Syllabus

Introduction to systemic view. Types of evolutionary systems. Systems modeling techniques and direct, indirect and mixed representations. Major evolutionary algorithms in the literature. Real-world applications (financial market, bioinformatics, task scheduling and production planning in industries) and robotic (automated synthesis system as antennas, controllers, test and verification of microprocessors, signal processing, computer vision and navigation robots).

Evaluation instruments and criteria

Evaluation method

Practical work in class and extra-class and tests.

Evaluation criterion

The final grade will be calculated based on the weighted average of the practical work performed and evidence.

Recovery

Practical work in class and extra-class and tests

Basic bibliography

- Text book:
 - Evolutionary Computation: A Unified Approach, Kenneth A. De Jong, MIT Press, Cambridge, 2006;
 - Complementary bibliography:
 - Experimental Research in Evolutionary Computation: The New Experimentalism, Thomas BartzBeielstein, SpringerVerlag, London, 2006;
 - Introduction to Stochastic Search and Optimization: Estimation, Simulation, and Control, James C Spall, John Wiley & Sons, 2003;
 - The Design of Innovation: Lessons from and for Competent Genetic Algorithms, David E Goldberg, Kluwer Academic Publisher, Boston, 2002;
 - Multiobjective Optimization using Evolutionary Algorithms, Kalyanmoy Deb, John Wiley & Sons, ChiChester UK, 2001;
 - Evolutionary Computation 1: Basic Algorithms and Operators, T Bäck, D B Fogel, Z Michalewicz, Taylor & Francis Group, New York, 2000;
 - Evolutionary Computation 2: Advanced Algorithms and Operators, T Bäck, D B Fogel, Z Michalewicz, Taylor & Francis Group, Institute of Physics Publishing, Bristol UK, 2000;
 - Metaheuristics: Progress as Real Problem Solvers, Toshihide Ibaraki, Koji Nonobe, Mutsunori Yagiura, Springer, 2005;
 - How to Solve it: Modern Heuristics, Zbigniew Michalewicz, David B. Fogel, SpringerVerlag, Berlin, 2004, 2nd Edition;
 - Computational Principles of Mobile Robotics, Gregory Dudek, Michael Jenkin, Cambridge Press, 2000.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Production of material as an educational resource or others for use by the external community (for example, Vestibulandos, high school, vocational courses, etc.). Development of projects that solve problems of the external community. Participation in fairs or proposal of activities for society.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in proposed activities. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic production: quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0715 - Intelligent Sensors

Class Credits: 2

Work Credits: 3

Total workload: 120 h

Type: Semester

Activation: 15/07/2019 **Deactivation:**

Goals

Allow students to integrate theoretical and practical aspects related to the use of sensors and actuators mainly applied to robotics. It will be presented sensor fusion, features extraction, filtering and data classification techniques, allowing decision making based on sensor data analysis.

Responsible teacher (s) (s)

1402765 - Márcio Eduardo Delamaro

Menu

Present concepts and practical aspects related to the implementation of intelligent sensors and actuators systems, as well as, demonstrate its applications into robotic tasks. Introduce examples of algorithms implementation for data acquisition, estimation, filtering and classification. Provide an overview about Hybrid Systems used for sensor data processing. Demonstrate practical applications of decision making systems based on estimated/processed sensor data. Present a practical approach based on hardware and software computer laboratory classes.

Syllabus

Concepts and practical implementation of intelligent sensors and actuators systems. Applications of intelligent sensors into robotic tasks. Implementation of algorithms for data acquisition, estimation, filtering and classification. Hybrid systems used for processing sensor data. Practical application of decision making systems based on estimated/processed sensor data. Practical activities using sensors/actuators hardware and software into computer laboratory classes.

Evaluation instruments and criteria

Evaluation method

Practical work in laboratory and extra-class.

Evaluation criterion

The final grade will be calculated based on the weighted average of the practical work performed in the laboratory and extra-class.

Recovery

The final grade will be calculated based on the weighted average of the practical work performed in the laboratory and extra-class.

Basic bibliography

- Text book:
 - SEBASTIAN THRUN, WOLFRAM BURGARD Probabilistic Robotics , Dieter Fox, MIT Press, 2005.
- Complementary bibliography:
 - Autonomous Mobile Robots (Control Engineering). CRC Press. (May 4, 2006).
 - Intelligent Mobile Robot Navigation. Springer-Verlag. First edition 2005.
 - ROLAND SIEGWART, ILLAH R. NOURBAKHSH Introduction to Autonomous Mobile Robots, MIT Press, 2004.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0720 - Software Engineering for Embedded Systems

Class Credits: 3

Work Credits: 1

Total workload: 75 h

Type: Semester

Activation: 01/01/2011 **Deactivation:**

Goals

Provide an overview of the development process of embedded software, emphasizing the characteristics of this software category.

Menu

Overview of Software Engineering, History of Embedded Systems, features and basic concepts, software development for embedded systems (requirements engineering, modeling, aspects of implementation, validation, verification and testing), dependability, security, support in run time (configuration and reconfiguration, mobility, location awareness), development of a project.

Syllabus

Overview of Software Engineering, History of Embedded Systems, features and basic concepts, software development for embedded systems (requirements engineering, modeling, aspects of implementation, validation, verification and testing), dependability, security, support in run time (configuration and reconfiguration, mobility, location awareness), development of a project.

Evaluation instruments and criteria

Evaluation method

Exhibition and practical classes, using the blackboard, audio-visual resources and software tools.

Evaluation criterion

Notes will be assigned to the monograph, exercises and work performed, some in class and others out of class. The final grade will be calculated by the weighted average of the students obtained by the student in the monograph, in the work and tests, during the semester.

Recovery

$(NP - 2) / 5 * MREC + 7 - NP$, if $MREC \geq 5$; or $\max\{np, mrec\}$, if $mrec < 5$

Basic bibliography

- Text book:
-Software Engineering for Embedded Systems Methods, Practical Techniques, and Applications Edited by: Robert Oshana and Mark Kraeling ISBN: 978-0-12-415917-4.
- GAO, J.Z.; TSAO, J.H.S.; WU, Y. "Testing and Quality Assurance for Component-Based Software", 466 pages, ISBN: 1580534805, Artech House Publishers, 2003.
- BASS, L.; CLEMENTS, P.; KAZMAN, R. "Software Architecture in Practice", ISBN: 0321154959, Addison-Wesley Professional; 2003.
- Complementary bibliography:
-SIMON, D.E. An Embedded Software Primer, Addison Wesley, ISBN: 020161569X, 1999.
-BARR, M.; ORAM, A. Programming Embedded Systems in C and C++, O'Reilly & Associates, ISBN: 1565923545, 1999.
-CRNKOVIC, I.; LARSSON, M. Building Reliable Component-Based Software Systems, 454 pages, ISBN: 1580533272, Artech House Publishers; 2002.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0724 - Advanced Learning Technologies

Class Credits: 3

Work Credits: 0

Total workload: 45 h

Type: Semester

Activation: 01/01/2013 **Deactivation:**

Goals

Provide pedagogical and computational foundations to develop advanced learning technologies. We expect students to obtain knowledge about the different areas of computing that contribute to solve educational problems (e.g. content generation, intelligent tutoring, educational data mining and automatic assessment) and how conducting research on educational technology can promote the advancement and development of Computer Science (e.g. new algorithms, better interfaces and techniques of human-computer interaction, etc.). At the end of the course the student will be able to map and implement instructional and pedagogical aspects in computer systems. The student will also be able to analyze and develop educational systems and learning objects using the state of the art applied to different domains (e.g. Mathematics, Portuguese, Computer Science and etc). Student will acquire skills to specify, prototype, analyze, design, implement, test and evaluate advanced learning technologies in real situations. The student will also be able to conduct scientific research within this theme.

Menu

Basic knowledge about instructional theories, educational theories and theories of human learning. Educational Software Engineering (methods and processes for development of educational systems, product lines for authoring content, etc.). Distance Education. Computer-Supported Collaborative Learning (CSCL). Learning objects. Serious games Gamification in education. Mobile and ubiquitous learning (m-learning). Usability and IHC for educational systems. Educational data mining and learning analytics. Intelligent tutoring systems. Artificial Intelligence in Education. Social Web, linked data and Semantic Web (e.g ontologies) in Education. Affective computing in educational systems. Technology and social entrepreneurship. Scientific research methodology for designing, implementing and assessing educational software.

Syllabus

Basic knowledge about instructional theories, educational theories and theories of human learning. Educational Software Engineering (methods and processes for development of educational systems, product lines for authoring content, etc.). Distance Education. Computer-Supported Collaborative Learning (CSCL). Learning objects. Serious games Gamification in education. Mobile and ubiquitous learning (m-learning). Usability and IHC for educational systems. Educational data mining and learning analytics. Intelligent tutoring systems. Artificial Intelligence in Education. Social Web, linked data and Semantic Web (e.g ontologies) in Education. Affective computing in educational systems. Technology and social entrepreneurship. Scientific research methodology for designing, implementing and assessing educational software.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work performed during the exhibition classes and in the laboratory.

Evaluation criterion

Evidence, projects and exercises. The final grade will be calculated by the weighted average of the test grades, projects and exercises obtained by the student during the course.

Recovery

(Np -2) / 5 * mrec + 7 - np, if mrec> 5 max {np, mrec}, if mrec <5

Basic bibliography

Textbook:

Tchounikine, P. Computer Science and Educational Software Design: A Resource for Multidisciplinary Work in Technology Enhanced Learning, Springer, 2011 ISBN-13: 978-3642200021

Deved ic, V. Semantic Web and Education, Elsevier, 2006 ISBN 978-0-387-35416-3

Barbosa, E. F. ; Maldonado, J. C. . Towards the establishment of IMA-CID: An integrated modeling approach for developing educational modules. Journal of the Brazilian Computer Society, v. 17, p. 207-239, 2011.

Complementary Bibliography:

Pimentel, M. & Fuks, H. Collaborative Systems, Elsevier, 2011 ISBN-13: 978-85-352-4669-8

Romiszowski, A. J. Designing Instructional Systems. Routledge, 1984 ISBN-13: 978-0893971816

Woolf, B. Building intelligent interactive tutors. Morgan Kauffman, 2008. ISBN-13: 978-0123735942

Nkambu, R., Mizoguchi, R., Bourdeau, J. Advances in Intelligent Tutoring Systems. Springer, 2010 ISBN 978-3-642-1432-5

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0726 - Software Reuse

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Type: Semester

Activation: 15/07/2017 **Deactivation:**

Goals

Improvement of the knowledge with regard to concepts related to software reuse, as well as methodologies, technologies, and supporting tools for reuse

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Presentation of general concepts, techniques, methods and tools for software reuse

Syllabus

This course offers to the students an introduction to the general concepts related to software reuse. Several techniques, methods as well as specific tools for supporting reuse are discussed, including component-based development, aspect-oriented software development, software product lines, application generators, service-oriented architecture, model-driven development and system-of-systems

Evaluation instruments and criteria

Evaluation method

Theoretical classes, accompanied by practical work and case studies inside and outside the classroom.

Evaluation criterion

Weighted average of tests and practical work performed during the course.

Recovery

Recovery proof. Approval Criteria: $NP + (MREC/2.5)$, if $MREC > 7.5$; or $\max\{np, mrec\}$, if $mrec \leq 5.0$; or 5.0, if $5.0 \leq mrec < 7.5$ ($np = 1st$ evaluation, $mrec = proof$).

Basic bibliography

Livros texto:

- CHEESMAN, J.; DANIELS, J. (2001). UML Components – A Simple Process for Specifying Component-Based Software, Addison-Wesley.
- CLARKE, S.; BANIASSAD, E. (2005). Aspect Oriented Analysis and Design. Addison-Wesley Object Technology Series.
- CLEAVELAND, J. C. (1988). Building Application Generators. IEEE Software, vol. 9, no. 4, July.
- CLEMENTS, P.; NORTHRUP, L. (2001). Software Product Lines. Practices and Patterns. Addison-Wesley.
- CZARNECKI, K.; EISENECKER, U. (2000). Generative programming: Methods, tools, and applications. Addison-Wesley.
- FAYAD, M. E.; JOHNSON, R. E. (eds) (2000). Domain-Specific Application Frameworks: Frameworks Experience by Industry, John Wiley & Sons.
- GOMAA, H. (2004) Designing Software Product Lines with UML: From Use Cases to Pattern-Based Software Architectures. Addison-Wesley.
- KRAFZIG, D.; BANKE, Karl; SLAMA, Dirk. (2005). Enterprise SOA – Service Oriented Architecture Best Practices, Prentice Hall.
- WEISS, D. M.; LAI, C. R. R. (1999). Software product-line engineering. Addison-Wesley.
- STAHL, T.; VOELTER, M. (2006) Model-Driven Software Development: technology, Engineering, Management. Willey.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0741 - Design and Implementation of Embedded Systems I

Class Credits: 3

Work Credits: 3

Total workload: 135 h

Type: Semester

Activation: 01/01/2011 **Deactivation:**

Goals

To identify the most relevant methodologies to support the development of real time embedded systems for the current applications, including concepts for code/hardware reuse, formal verification, and software development.

Menu

System design from Hardware Description Languages (VHDL, Verilog) and Finite State Machine for Field-Programmable Gate Array (FPGA) devices. Hardware/Software Co-design for System-on-Chip (SoC) considering hardware reuse by IPs and Cores. Electronic Design Automation (EDA) tools for FPGAs are used. This study takes into account concepts related to software engineering; clock synchronization; communication protocol; scheduling; Real Time Operating System (RTOS); fault tolerance; sensors and actuators programming; distributed systems; simulation, validation, and verification.

Syllabus

System design from Hardware Description Languages (VHDL, Verilog) and Finite State Machine for Field-Programmable Gate Array (FPGA) devices. Hardware/Software Co-design for System-on-Chip (SoC) considering hardware reuse by IPs and Cores. Electronic Design Automation (EDA) tools for FPGAs are used. This study takes into account concepts related to software engineering; clock synchronization; communication protocol; scheduling; Real Time Operating System (RTOS); fault tolerance; sensors and actuators programming; distributed systems; simulation, validation, and verification.

Evaluation instruments and criteria

Evaluation method

Expository and laboratory classes using the blackboard, audio-visual resources, EDA (Electronic Design Automation) software tools and hardware development signs.

Evaluation criterion

Notes will be assigned to the monograph, exercises and work performed in the laboratory, some in class and others out of class. The final grade will be calculated by the weighted average of the students obtained by the student in the monograph, in the work and tests, during the semester.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC> = 5; or max {np, mrec}, if mrec <5

Basic bibliography

- Text book:

-ROWEN, C. Engineering the Complex SoC: Fast, Flexible Design with Configurable Processors, Prentice Hall, 2004
-LI, O; YAO, C. "Real-Time Concepts for Embedded Systems", ISBN: 1578201241, 294 pages, CMP Books; 2003.

- Complementary bibliography:

-PELLERIN, D.; THIBAULT, S. "Practical FPGA Programming in C", ISBN: 0131543180, 448 pages, Prentice Hall, 2005.
-Wolf W. "FPGA-Based System Design", ISBN: 0131424610, 576 pages, Prentice Hall, 2004.
-KATZ, R.H. Contemporary Logic Design, The Benjamin/Cummings Publishing, 1994.
-JERRAYA, A.A.; W. Wolf, Multiprocessor Systems on-Chips, Morgan Kaufmann, 2004.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0744 - Distributed Computation

Class Credits: 3

Work Credits: 3

Total workload: 135 h

Type: Semester

Activation: 15/07/2017 **Deactivation:**

Goals

Improve the knowledge obtained in the Distributed Computing Systems and Concurrent Programming, through a practical approach.

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Review and practical application of the concepts of Distributed Computing Systems and Concurrent Programming.

Syllabus

Review and practical application of the concepts of Distributed Computing Systems and Concurrent Programming.

Evaluation instruments and criteria

Evaluation method

Exhibition and discussion of relevant topics related to the practical projects developed by the students. The projects are developed in and out of class, with presentation and discussion of the progress and results obtained in the form of seminars.

Evaluation criterion

The evaluation will be made through grades obtained in weekly evaluations involving the discussion of the projects and final evaluation through the presentation of the project before a bank consisting of the teachers responsible for the discipline and a guest teacher, from the project area.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC >= 5; or max {np, mrec}, if mrec < 5

Basic bibliography

Livro Texto

COULOURIS, G.; DOLLIMORE, J.; KINDBERG, T. Gordon B. Distributed Systems: Concepts and Design, Addison-Wesley, Hardcover, 5th edition, Published May 2013, 1067 pages, ISBN 0132143011

Bibliografia Complementar

TANEMBAUM, A. S. Distributed Systems: Principles and Paradigms (2nd Edition), Prentice Hall, 2006, 704 pages.

TEL, G. Introduction to Distributed Algorithms, Cambridge University Press; 2 edition (October 16, 2000). ISBN-10: 0521794838, 612 pages

GARG, V. K. Elements of Distributed Computing. Wiley-IEEE Press; 1 edition (May 23, 2002), ISBN-10: 0471036005, 448 pages

GHOSH, S. "Distributed Systems: An Algorithmic Approach, Second Edition", 2014, ISBN: 1466552972, 552 pages

PIERSON, J. M. "Large-Scale Distributed Systems and Energy Efficiency: A Holistic View", 2015, ISBN: 1118864638, 336 pages.

Periódicos da Área

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0745 - Real-time Computer Systems

Class Credits: 3

Work Credits: 0

Total workload: 45 h

Type: Semester

Activation: 15/07/2017 **Deactivation:**

Goals

Introduction to the problems characterizing of real-time systems and to the specific development methodologies for computer systems with temporal requirements.

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Introduction to the concept of real-time, specification of temporal requirements, categories of temporal constraints, time measurement, scheduling algorithms, real-time computer applications.

Syllabus

Introduction to the concept of real-time, specification of temporal requirements, categories of temporal constraints, time measurement, scheduling algorithms, real-time computer applications. Real-time operating systems, software and hardware, classical algorithms, analytic and non-analytic approaches to the analysis and design of real-time computer systems.

Evaluation instruments and criteria

Evaluation method

Exhibition classes followed by resolution of exercise in the room.

Evaluation criterion

Weighted average of the notes in tests and proposed exercises.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC >= 5; or max {np, mrec}, if mrec < 5

Basic bibliography

- Text book:

-LAPLANTE, P. A. Real-Time Systems Design and Analysis , ISBN: 0471228559, 528 pages, Wiley-IEEE Press; 2004.

-LIU, J.W.S. Real-Time Systems , ISBN: 0130996513, 610 pages, Prentice Hall; 2000.

• Complementary bibliography:

-KOPETZ, H. Real-Time Systems : Design Principles for Distributed Embedded Applications , ISBN: 0792398947, 352 pages, Springer;1997.

-CHENG, A.M.K. Real-Time Systems : Scheduling, Analysis, and Verification , ISBN: 0471184063, 552 pages, Wiley-Interscience, 2002.

-YAO, C.; LI, Q. Caroline Real-Time Concepts for Embedded Systems , ISBN: 1578201241, 294 pages, CMP Books; 2003.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0748 - Mobile Networks

Class Credits: 3

Work Credits: 2

Total workload: 105 h

Type: Semester

Activation: 01/01/2011 **Deactivation:**

Goals

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Theoretical classes followed by application exercises and questions.

Evaluation criterion

Weighted average of the test notes and group work.

Recovery

Nota Final: = $(NP-2) / 5 * Mrec + 7 - NP \leq Mrec \leq 5$; ou

Max (np, mrec) if mrec < 5

Being np = grade of the 1st evaluation and

MREC = Recovery Average

Basic bibliography

- Text book:
 - STALLINGS, W. Wireless Communication and Networks, 2a edição - Prentice Hall.
- Complementary bibliography:
 - TSE, DAVID; VISWANATH, P. Fundamentos de Wireless Communication, Cambridge University Press.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0901 - Laboratory on Security Engineering

Class Credits: 2

Work Credits: 1

Total workload: 60 h

Extension workload: 15 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Provide students with a broad and practical overview of computer security.

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

2529921 - Kalinka Regina Lucas Jaquie Castelo Branco

Menu

Hands-on classes exploring security concepts using tools like Metaexploitable Machine, Kali Linux, wireshark, and the Netkit tool.

Syllabus

Case studies (laboratory exploitation of techniques and countermeasures) - IPSEC-Racoon Laboratory; Portscan Laboratory; HoneyPot Laboratory; Snort Laboratory; Squid Proxy Laboratory; Proxy Lab. Attack Techniques and Countermeasures: Introduction to Fault Scan; Vulnerable service exploit - vsFTPD; Privilege Escalation - Buffer Overflow; Heap Overflow; Exploring Web Applications; Pentest; BlueBorne vulnerability.

Evaluation instruments and criteria

Evaluation method

Practical evidence. Practical work done inside and outside the laboratory.

Evaluation criterion

Weighted average (NP) of evidence and works.

Recovery

Recovery Proof (MREC). Criterion: $NP + (MREC/2.5)$, if $MREC >= 7.5$; or $\max\{np, mrec\}$, if $mrec <= 5.0$; or 5.0, if $5.0 < mrec < 7.5$ ($np = 1$ st evaluation, $MREC = \text{recovery test}$).

Basic bibliography

Livro Texto:

STALLINGS, W. Criptografia e Segurança de Redes, 4a. edição - Prentice Hall.

Bibliografia Complementar:

STALLINGS, W; BROWN, L. Computer Security: Principles and Practice. 3a. Ed.:Pearson, 2016.

ANDERSON, R. Security Engineering, 2nd Edition, Willey.

GURGEL, P., BRANCO, K. BRANCO, L., BARBOSA, E., TEIXEIRA, M. Redes de Computadores – Da teoria à prática com Netkit – 1a. edição Campus Elsevier, 2014.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Provision of didactic material in various formats (areas, videos, tutorials, games)

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in proposed activities. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0952 - Internet of Things

Class Credits: 2

Work Credits: 2

Total workload: 90 h

Extension workload: 30 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

To transmit to students concepts about Internet of Things, considering their aspects related to hardware and software, with a view to the development of innovative applications for solving real world problems.

Responsible teacher (s) (s)

235343 - Alexandre Cláudio Botazzo Delbem

Menu

Introduction to the Internet of Things. Introduction of BigData. Introduction to Cloud Computing. Sustainability and Digital Technologies. Laws and Regulations for IoT. Requirements and Infrastructure for IoT (Hardware and Software). Networks of Sensors and Technologies of Communication and Security. Tracking Technologies. Development of applications for IoT - Smart Cities, Health Care, Logistics and Public Sector. Performance evaluation of computational systems in the context of IoT.

Syllabus

Introduction to the Internet of Things: Concepts, History, Key Technologies, Architectures, Applications, Evolution; Introduction to BigData: Introductory Principles and Their Properties. Concepts related to the variety, volume and speed of data access. Infrastructure and techniques for extracting large volumes of data. Web tools to remotely analyze data; Introduction to Cloud Computing: Introducing Key Concepts of Cloud Computing, considering both theoretical and practical aspects; Sustainability and Digital Technologies: Concepts, Challenges, Green Data Center, Social and Financial Aspects; Requisites and Infrastructure for IoT (Hardware and Software): Methodologies for specification, design and execution. Introduction to Embedded Systems. Control of Electronic Systems over the Internet. Middlewares for IoT; Networks of Sensors and Communication Technologies: Introduction to WSN concepts; Tracking Technologies: Introduction to tracking and its techniques, applications and services; Application Development for IoT: Present market solutions in several areas, including the public (health, education, heritage) and private sector: logistics, energy, etc. Study of real cases of systems developed in the world. Discussions about planning an application involving the above areas; Performance Evaluation of Computational Systems for IoT: Experiment Planning, Configuration of the Environment, Execution of Experiments and Analysis of Results.

Evaluation instruments and criteria

Evaluation method

Exhibition followed by exercises and practical work.

Evaluation criterion

Notes will be assigned to exercises and practical work performed outside class, and in the tests on the subjects of the program. The final grade will be calculated by the weighted average of these grades obtained by the student during the semester.

Recovery

(NP -2) / 5 * MREC + 7 - NP, if MREC> = 5; or max {np, mrec}, if mrec <5

Basic bibliography

Livros Texto:

McEwen, A; Cassimally, H. - Designing the Internet of Things Paperback, 1st ed. 2013.
MUKHOPADHYAY, S.C. Internet of Things: Challenges and Opportunities. Springer Science & Business Media, 2014, 269 p.

Bibliografia Complementar:

Miller, M - The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World - 2015
ERMESAN, O.; FRIESS, P. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems. River Publishers, 2013,
Hwang, K., Dongarra, J., Fox, G.C. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things. ISBN: 9780128002049, Elsevier, 2013
Mayer-Schönberger, V.; Cukier, K. Big Data: A Revolution That Will Transform How We Live, Work, and Think. Eamon Dolan/Mariner Books; Reprint edition. 2014. 272 p.
Finlay, S. Predictive Analytics, Data Mining and Big Data: Myths, Misconceptions and Methods. Palgrave Macmillan. 2014. 260 p
Rajkumar Buyya, James Broberg, Andrzej M. Goscinski. Cloud Computing: Principles and Paradigms, ISBN: 0470940093, 9780470940099, . Wiley, 664 pages, 2010.
Mell, P.; Grance, T. The NIST Definition of Cloud Computing," US Nat'l Inst. of Science and Technology, 2011
Erl, T.; Mahmood, Z.; Puttini, R. Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, 2013.
Gentile, C., Alsindi, N., Raulefs, R., Teolis, C. Geolocation Techniques: Principles and Applications. Springer. 2013
KIRUSNAPILLAI SELVARAJAH et al. Deploying Wireless Sensor Devices in Intelligent Transportation System Applications. [s.l.] INTECH Open
Dargie, W.; C. Poellabauer, C. Fundamentals of Wireless Sensor Networks: Theory and Practice, Wiley. 2010
Uckelmann, D., Harrison, M., Michahelles, F.. Architecting the Internet of Things. Springer, 2011.
JAIN, J., The art of Computer Systems Performance Analysis, John Wiley & Sons, Inc., 1996.
MENASCE, D.A.; ALMEIDA, V.A.F., Capacity Planning for web Services: Metrics, Models, and Methods, Prentice Hall, 2001.
MENASCE, D.A.; DOWDY, L.W.; ALMEIDA, V.A.F., Performance by Design: Capacity Planning by Example (Paperback), 2004, Prentice Hall, ISBN 0-13-090673-5.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public).

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Density development of solutions that can be applied and public environments making them Smart environments. Provision of didactic material in various formats (areas, videos, tutorials) and lectures/seminars on the subjects of the discipline

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in proposed activities. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SSC0958 - Cryptocurrencies and Blockchain

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Type: Semester

Activation: 01/01/2022 **Deactivation:**

Goals

Provide the student with an overview of the state of the art in cryptocurrencies, as well as the deepening of the main distributed ledger platforms, such as the Blockchain. Decentralized applications using smart contracts will also be studied throughout the course.

Responsible teacher (s) (s)

63645 - The Wesa

1402765 - Márcio Eduardo Delamaro

5832884 - Rodolfo Leopolito Meneguette

Menu

Study of blockchain and Bitcoin and other emerging cryptocurrencies. The use of smart contracts and development platforms. Decentralized and decentralized autonomous organization (DAO) applications

Syllabus

- Security properties such as privacy, authentication and integrity - Symmetric and asymmetric cryptography - Introduction to the distributed ledger technology (DLT) - The main blockchain implementations - Bitcoin - Ethereum - Blockchain types such as private, public, permissioned and non-permissioned - Transactions and the CAP theorem - Consensus protocols - Byzantine fault tolerance - Proof of Work (PoW) - Proof of Stake (PoS) - Cryptocurrencies - Theory (what it is, the emission rate, advantages, financial backing) - Implementation aspects - Emerging Topics related to DLTs and cryptocurrencies - Emerging topics (eg, NFT, DeFi, whatever was at the time of the study) - Emerging cryptocurrencies - Smart Contracts - Definition - Implementation aspects - Main applications - Autonomous decentralized organization (DAO) - Theory - Main applications

Evaluation instruments and criteria

Evaluation method

Evaluation through written evidence and practical work.

Evaluation criterion

Notes will be assigned to tests and practical work, some in class and others out of class. The final grade will be calculated by average of the students obtained by the student during the semester.

Recovery

The final grade (MF) of the student who took recovery test will depend on the semester average (MS) and the average recovery test (MR), as follows:

- $mf = 5$ if $5 \leq mr \leq (10 - ms)$
- $mf = (ms + mr) / 2$ if $mr > (10 - ms)$
- $mf = ms$ if $mr < 5$

Basic bibliography

Livro- texto:

- MARTINS, P.; Introdução à Blockchain. Bitcoin. Criptomoedas. Smart Contracts. Conceitos. Tecnologia. Implicações; editora FCA, 2018
 - BASHIR, I.; Mastering Blockchain, 2018
- Complementar:
- SINGHAL, B.; DHAMEJA, G.; PANDA, P. S.; Beginning Blockchain; Apress, 2018

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0289 - Supervised Exchange Project I

Class Credits: 4

Work Credits: 10

Total workload: 360 h (Internship: 300 h)

Type: Semester

Activation: 15/07/2020

Deactivation:

Goals

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Follow -up by the responsible for disciplining the progress of activities and writing the monograph.

Evaluation criterion

A detailed monograph will be elaborated on the work done. The final grade will be decided based on the evaluation of this monograph and a presentation of the work developed for a bank.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC or = 7.5; or max {np, mrec}, if mrec or = 5.0; or 5.0, if 5.0 or = mrec 7.5. (NP = 1st evaluation, mrec = proof)

Basic bibliography

Books, manuals and articles linked to the area in which the work will be developed.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0293 - Undergraduate Project I

Class Credits: 4

Work Credits: 10

Total workload: 360 h (Internship: 300 h)

Type: Semester

Activation: 15/07/2020

Deactivation:

Goals

Responsible teacher (s) (s)

2162972 - Rudinei Goularte

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Meetings with the person responsible for the discipline or the advisor to report the progress of the project, advice, indication of bibliographic references and writing of monographs.

Evaluation criterion

A detailed monograph will be elaborated on the project carried out. The final grade will be decided on the basis of the evaluation of this monograph and a presentation of the work developed by a bank made up of two teachers, one of which is responsible for the discipline.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC or = 7.5; or max {np, mrec}, if mrec or = 5.0; or 5.0, if 5.0 or = mrec 7.5. (NP = 1st evaluation, mrec = proof)

Basic bibliography

Books, manuals and articles linked to the area in which the project will be developed.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0300 - Entrepreneurs Project I

Class Credits: 4

Work Credits: 10

Total workload: 360 h (Internship: 300 h)

Type: Semester

Activation: 15/07/2020

Deactivation:

Goals

To allow the student to demonstrate entrepreneurship, describing and documenting projects developed by a formally constituted company of which (s)he is an active partner.

Responsible teacher (s) (s)

793065 - John of the Holy Spirit Batista Neto

2162972 - Rudinei Goularte

Menu

The student will provide the description of a project developed or a text systematizing the work done at a formally constituted company, in which the student must be a member acting for at least one year. The student should have the supervision of a supervising teacher. The company must act in the computing area. At the end the student should write a detailed monograph about the project.

Syllabus

The student will provide the description of a project developed or a text systematizing the work done at a formally constituted company, in which the student must be a member acting for at least one year. The student should have the supervision of a supervising teacher. The company must act in the computing area. At the end the student should write a detailed monograph about the project.

Evaluation instruments and criteria

Evaluation method

Meetings with the supervisor teacher to evaluate the progress of the internship and project, counseling, indication of bibliographic references and writing of monographs. The teacher responsible for the discipline should evaluate the project presented by the student, in agreement with his supervisor, and guide the student in the different stages of the discipline.

Evaluation criterion

Preparation of a detailed monograph of the internship performed. Presentation of an evaluation by a company customer. The final grade will be decided based on the evaluation of the content and presentation of the monograph in the face of a

bank formed by two members, one of which is responsible for the discipline and based on the evaluation made by the company's customer.

Recovery

$(Np - 2) / 5 * mrec + 7 - np$, if $mrec > 5$ max {np, mrec}, if $mrec < 5$

Basic bibliography

- Books, manuals and articles linked to the area in which the project will be developed.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SME0878 - Statistical Data Mining

Class Credits: 4

Work Credits: 2

Total workload: 120 h

Extension workload: 60 h

Type: Semester

Activation: 15/07/2024 **Deactivation:**

Goals

Introduced to the students with the key concepts and techniques of statistical data mining . The theory will be developed with applications in several areas of knowledge , among which , biology , economics, engineering , finance and medicine.

Responsible teacher (s) (s)

2950182 - Francisco Aparecido Rodrigues

1595890 - Mariana Cúri

Menu

Introduction to data mining . Statistical analysis of data. The process of knowledge discovery . Segmentation data summarization . Methods of supervised classification . Measures of predictive ability . Association analysis . Cluster analysis . Methods of dimensionality reduction . Feature selection techniques . Combination of classifiers .

Syllabus

Introduction to data mining . Data mining and statistical analysis . Importance of the database . The KDD process . Procedures based segmentation . Summarization. Supervised classification models . Punctual and prediction models , logistic regression , probit regression , logistic regression limited . Temporal prediction models , empirical estimates of the survival function and the hazard function , basic parametric models , estimation , compração models . Measures of predictive ability . Association analysis . Cluster Analysis . Dimensionality reduction . Selection of attributes . Combination of classifiers .

Evaluation instruments and criteria

Evaluation method

The evaluation will be made by one or more of the following means:

- Individual tests
- Works or exercises performed individually or in group
- Case studies in groups
- Presentation of seminars individually or in group

Evaluation criterion

Evidence and exercises, inside and outside the class.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests.

Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:

$$MF = 5 \text{ se } 5 \leqslant MR \leqslant (10 - MS)$$

$$MF = (MS + MR) / 2 \text{ se } MR > (10 - MS)$$

$$MF = MS \text{ se } MR < 5$$

Basic bibliography

TEXT BOOKS:

Francisco Louzada-Neto and Carlos A. R. Diniz. Statistical Techniques in Data Mining. IMA, Lima, 2002.

Sergios Theodoridis, Konstantinos Koutroumbas. Pattern Recognition, Academic Press; 4 edition, 2008.

Trevor Hastie, Robert Tibshirani and Jerome Friedman. The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Springer-Verlag, 2001.

Complementary Bibliography:

Christopher M. Bishop. Pattern Recognition and Machine Learning, Springer, 2007.

Ian H. Witten, Eibe Frank, Morgan Kaufmann. Data Mining: Practical Machine Learning Tools and Techniques, 2005.

Katti Faceli, Ana Carolina Lorena, João Gama and André C. P. L. F. de Carvalho.

Artificial Intelligence A machine learning approach, LTC, 2011.

Olivia Park Rud, Data Mining Cookbook- Modeling Data for Marketing, Risk, and Customer Relationship Management. Wiley, 2001.

Pang-Ning Tan, Michael Steinbach, Vipin Kumar. Introduction to Data Mining, Addison Wesley, 2005.

Extension activities

Social Group target of the activity

External community (public school students, people who want to enter the university and the general public). Researchers and professionals interested in data mining analysis.

Objectives of the activity

Promote interaction between the University and Society, with the participation of students, seeking the commitment of the university community with interests and needs of the target group.

Activity Description

Development of practical projects of interest to society or a researcher/company to be conducted by Problem-Based Learning (PBL), captured by the Applied Statistics Center (NEA), Center for Mathematical Sciences Applied to Industry (CEMAI) or other research centers.

Activity evaluation indicators

Evaluation of projects by the participating community to verify that the proposed solution meets the demand. Evaluation of receptivity and community participation in developed projects. Application of theoretical knowledge: Evaluation of students' ability to apply the knowledge acquired in the classroom to develop solutions for the community served. Academic Production: Quality and relevance of educational reports, projects and materials produced by students as a result of extension activity.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0290 - Supervised Exchange Project II

Class Credits: 4

Work Credits: 10

Total workload: 360 h (Internship: 300 h)

Type: Semester

Activation: 15/07/2020

Deactivation:

Goals

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Follow -up by the responsible for disciplining the progress of activities and writing the monograph.

Evaluation criterion

A detailed monograph will be elaborated on the work done. The final grade will be decided based on the evaluation of this monograph and a presentation of the work developed for a bank.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC or = 7.5; or max {np, mrec}, if mrec or = 5.0; or 5.0, if 5.0 or = mrec 7.5. (NP = 1st evaluation, mrec = proof)

Basic bibliography

Books, manuals and articles linked to the area in which the work will be developed.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0294 - Undergraduate Project II

Class Credits: 4

Work Credits: 10

Total workload: 360 h (Internship: 300 h)

Type: Semester

Activation: 15/07/2020

Deactivation:

Goals

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Meetings with the person responsible for the discipline or the advisor to report the progress of the project, advice, indication of bibliographic references and writing of monographs.

Evaluation criterion

A detailed monograph will be elaborated on the project carried out. The final grade will be decided on the basis of the evaluation of this monograph and a presentation of the work developed by a bank made up of two teachers, one of which is responsible for the discipline.

Recovery

Approval Criteria: NP+(MREC/2.5), if MREC or = 7.5; or max {np, mrec}, if mrec or = 5.0; or 5.0, if 5.0 or = mrec 7.5. (NP = 1st evaluation, mrec = proof)

Basic bibliography

Books, manuals and articles linked to the area in which the project will be developed.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SCC0302 - Entrepreneurs Project II

Class Credits: 4

Work Credits: 10

Total workload: 360 h (Internship: 300 h)

Type: Semester

Activation: 15/07/2020

Deactivation:

Goals

To allow the student to demonstrate entrepreneurship, describing and documenting projects developed by a formally constituted company of which (s)he is an active partner.

Responsible teacher (s) (s)

793065 - John of the Holy Spirit Batista Neto

2162972 - Rudinei Goularte

Menu

The student will provide the description of a project developed or a text systematizing the work done at a formally constituted company, in which the student must be a member acting for at least one year. The student should have the supervision of a supervising teacher. The company must act in the computing area. At the end the student should write a detailed monograph about the project.

Syllabus

The student will provide the description of a project developed or a text systematizing the work done at a formally constituted company, in which the student must be a member acting for at least one year. The student should have the supervision of a supervising teacher. The company must act in the computing area. At the end the student should write a detailed monograph about the project.

Evaluation instruments and criteria

Evaluation method

Meetings with the supervisor teacher to evaluate the progress of the internship and project, counseling, indication of bibliographic references and writing of monographs. The teacher responsible for the discipline should evaluate the project presented by the student, in agreement with his supervisor, and guide the student in the different stages of the discipline.

Evaluation criterion

Preparation of a detailed monograph of the internship performed. Presentation of an evaluation by a company customer. The final grade will be decided based on the evaluation of the content and presentation of the monograph in the face of a

bank formed by two members, one of which is responsible for the discipline and based on the evaluation made by the company's customer.

Recovery

$(Np - 2) / 5 * mrec + 7 - np$, if $mrec > 5$ max {np, mrec}, if $mrec < 5$

Basic bibliography

- Books, manuals and articles linked to the area in which the project will be developed.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: 5500002 - Seminars on organizational management

Class Credits: 1

Work Credits: 1

Total workload: 45 h

Type: Semester

Activation: 01/01/2020 **Deactivation:**

Goals

Responsible teacher (s) (s)

3761610 - Thiago Alexandre Salgueiro Pardo

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Exhibition of seminars with guest speakers and associated practical activities.

Evaluation criterion

Notes will be assigned to participation and presence in seminars. The final grade will be calculated by the weighted average of these notes.

Recovery

-Approval Criterium: $NP + (MREC/2.5)$, if $MREC > 7.5$; or $\max\{NP, MREC\}$, if $MREC \leq 7.5$; or 5.0, if $NP = MREC = 7.5$. ($NP = 1$ st evaluation, $MREC =$ proof)

Basic bibliography

Books, manuals and articles related to the selected topic.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SMA0392 - Calculus I (semi-presencial)

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2024 **Deactivation:**

Goals

Students should be able to understand the meaning of limit, continuity, derivative, and primitive of a one real variable function. This offer will be exclusive to interested students, optionally, and who meet the following criteria: having already attended the SMA0353-Calculus I in person, having obtained a grade between 3.0 and 4.9 and attendance equal to or greater than 70%. Enrollment in the course will be done through the Application for Enrollment.

Responsible teacher (s) (s)

4873332 - DANIEL SMANIA BRANDÃO

Menu

Real functions. Limits. Continuity. Derivatives. Primitives.

Syllabus

The real numbers. Functions of one real variable. Limit. Continuity. Differentiability. The chain rule. Related rates. Maxima and minima of functions. Graph of functions. Taylor's formula. Differential. Primitives.

Evaluation instruments and criteria

Evaluation method

Throughout the semester will be offered to the students various exhibition materials, such as recorded classes, videos and/or class notes, with fixation through exercise lists.

Evaluation criterion

Evaluation through face -to -face tests, works and seminars.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests. Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:
 $Mf = 5 \text{ if } 5 < mr \leq ms$; $Mf = (ms + mr) / 2 \text{ if } mr > 10 - ms$; $Mf = ms \text{ if } mr < 5$.

Basic bibliography

TEXT BOOKS:

- Guidorizzi, H.L. A calculation course, 5th ed., V. 1, Rio de Janeiro: Technical and Scientific Books Editora, (2001).
- Stewart, J. Calculation, V. 1 and 2, 4th ed., Pioneer, São Paulo, (2001).
- Thomas, G.B. Calculation, V. 1, 10th ed., Addison-Wesley, São Paulo, (2002).
- Táboas, P.Z. Differential and integral calculation in the line, class grades, ICMC-USP.

Complementary:

- Swokowski, E.W. Calculation with Analytical Geometry, V. 1 and 2, 2a. Edition, Makron-Books of Brazil Editora Ltda, Rio de Janeiro, (1995).
- SIMMONS, G.F. Calculation with Analytical Geometry, V. 1 and 2, MC Graw-Hill of Brazil, Rio de Janeiro, (1987).
- Count, A. Fast Calculus, ICMC-USP, 2001.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SMA0394 - Analytic Geometry (semi-presencial)

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2024 **Deactivation:**

Goals

The discipline aims at familiarizing students with analytic geometry in 2 and 3 dimensions, emphasizing its geometric aspects and their translations into Cartesian coordinates. This offer will be exclusive to interested students, optionally, who meet the following criteria: having already attended the SMA0300-Analytical Geometry course (or its equivalent in the equivalences table of the Department of Mathematics at ICMC-USP) in person, obtaining a grade between 3.0 and 4.9, and maintaining a attendance rate equal to or greater than 70%. Enrollment in the course will be done through a Registration Request.

Responsible teacher (s) (s)

4873332 - DANIEL SMANIA BRANDÃO

Menu

Coordinate systems. Lines and planes. Conics. Quadrics.

Syllabus

Cartesian coordinates. Vectors. Linear dependence. Basis. Dot product. Vector product. Translation and rotation. Lines and planes. Distance and angle. Conics. Reduced equation of a quadric surface. Polar, cylindrical and spherical coordinates.

Evaluation instruments and criteria

Evaluation method

Throughout the semester will be offered to the students various exhibition materials, such as recorded classes, videos and/or class notes, with fixation through exercise lists.

Evaluation criterion

Evaluation through face -to -face tests, works and seminars.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests. Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:
 $Mf = 5 \text{ if } 5 < or = mr < or = (10 - ms); Mf = (ms + mr) / 2 \text{ if } mr > 10 - ms; Mf = ms \text{ if } mr < 5.$

Basic bibliography

TEXT BOOKS:

- .Winterle, P., Steinbruch, A., Analytical Geometry, a vector treatment, Rio de Janeiro: MacGraw-Hill, 1987.
- .Caroli, A., Callioli, C.A, Feitosa, M.O., Matrices, Vectors and Analytical Geometry, 9 ed, Sao Paulo: Nobel, 1978.
- .Boulos, P., Camargo, I., Analytical Geometry - A Vector Treatment, Rio de Janeiro: McGraw -Hill, 1987.

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SMA0390 - Calculus II (semi-presencial)

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 15/07/2023 **Deactivation:**

Goals

Students should be able to understand the meaning of definite integrals and how to compute them. They also should be able to understand the meaning of limit, continuity, and differentiability of functions of several variables. This offer will be exclusive to interested students, optionally, and who meet the following criteria: having already attended the SMA0354-Calculus II in person, having obtained a grade between 3.0 and 4.9 and attendance equal to or greater than 70% . Enrollment in the course will be done through the Application for Enrollment.

Responsible teacher (s) (s)

4873332 - DANIEL SMANIA BRANDÃO

Menu

Definite integral. Integration techniques. Improper integrals. Several variable functions. Limit. Partial derivatives. Maxima and minima.

Syllabus

Definite integral. Integration techniques. Definite integral applications. Improper integrals. Curves. Several variable functions. Limit. Partial derivatives. The chain rule and applications. Gradient and directional derivatives. Tangent planes and normal lines. Taylor polynomial. Maxima and minima of several variable functions. Lagrange multipliers.

Evaluation instruments and criteria

Evaluation method

Throughout the semester will be offered to the students various materials exhibitions, such as recorded classes, videos and/or class grades, with fixation through exercise lists.

Evaluation criterion

Evaluation through face -to -face tests, works and seminars.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests. Approval criteria: the final grade (MF) of the student who took tests recovery will depend on the semester average (MS) and the average test recovery (MR), as follows: $Mf = 5$ if $5 \leq mr \leq ms$; $Mf = (ms + mr) / 2$ if $mr > 10 - ms$; $Mf = ms$ if $mr < 5$.

Basic bibliography

TEXT BOOKS:

- Guidorizzi, H.L. A calculation course, 5th ed., V. 1, Rio de Janeiro: Technical and Scientific Books Editora, (2001).
- Stewart, J. Calculus, V. 1 and 2, 4th ed., Pioneer, São Paulo, (2001).
- Thomas, G.B. Calculation, V. 1, 10th ed., Addison-Wesley, São Paulo, (2002).
- Táboas, P.Z. Differential and integral calculation in the line, class grades, ICMC-USP.
- Carvalho, A.N.; NUNES, W.V.L.; ZANI, S.L. CALCULATION NOTES – ICMC-USP.
- Mendes, C.M. Class notes, functions of various variables – curves parameterized, (2005).
- Mendes, C.M. Class Notes, functions of various variables – Differentiation, (2005).

Complementary:

- Swokowski, E.W. Calculation with Analytical Geometry, V. 1 and 2, 2a.

Edition, Makron-Books of Brazil Editora Ltda, Rio de Janeiro, (1995).

- Simmons, G.F. Calculation with Analytical Geometry, V. 1 and 2, MC Graw-Hill of Brazil, Rio de Janeiro, (1987).

Additional information on the current class schedule (in Portuguese)

Course: SMA0393 - Calculus III (semipresencial)

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 01/01/2024 **Deactivation:**

Goals

Introduce students to the fundamental results concerning: differentiability of functions of several variables, multiple integrals, line integrals, and surface integrals. This offer will be exclusive to interested students, optionally, and who meet the following criteria: having already attended the SMA0353-Calculus I in person, having obtained a grade between 3.0 and 4.9 and attendance equal to or greater than 70% . Enrollment in the course will be done through the Application for Enrollment.

Responsible teacher (s) (s)

4873332 - DANIEL SMANIA BRANDÃO

Menu

Double and triple integrals. Line integrals. Surface integrals. Stokes' theorem.

Syllabus

Double integrals. Coordinate transformations. Triple integrals. Vector calculus. Line integrals. Green's theorem. Surface integrals. Gauss' theorem. Stokes' theorem.

Evaluation instruments and criteria

Evaluation method

Throughout the semester will be offered to the students various exhibition materials, such as recorded classes, videos and/or class notes, with fixation through exercise lists.

Evaluation criterion

Evaluation through face -to -face evidence, works and/or seminars.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests. Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the semester average (MS) and the average recovery tests (MR), as follows:
 $Mf = 5 \text{ if } 5 \leq mr \leq ms$; $Mf = (ms + mr) / 2 \text{ if } mr > 10 - ms$; $Mf = ms \text{ if } mr < 5$.

Basic bibliography

TEXT BOOKS:

- OAK, A.N.; NUNES, W.V.L.; ZANI, S.L. CALCULATION NOTES-ICMC-USP.
- Guidorizzi, H.L. A calculation course, 5th ed., V. 2 and 3, Rio de Janeiro: Technical and Scientific Books Editora, (2002).
- Stewart, J. Calculation, V. 1 and 2, 4th ed., Pioneer, São Paulo, (2001).
- Thomas, G.B. Calculation, V. 2, 10th ed., Addison-Wesley, São Paulo, (2002).

Complementary:

- MENDES, C.M. Line and surface integral class notes, ICMC.
- MENDES, C.M. Calculation class notes III, ICMC-USP.
- SIMMONS, G.F. Calculation with Analytical Geometry, V. 2, MC Graw-Hill of Brazil, Rio de Janeiro, (1987).
- Swokowski, E.W. Calculation with Analytical Geometry, V. 2, 2a. Edition, Makron-Books of Brazil Editora Ltda, Rio de Janeiro, (1995).

[Additional information on the current class schedule \(in Portuguese\)](#)

Course: SMA0391 - Calculus IV (semi-presencial)

Class Credits: 4

Work Credits: 0

Total workload: 60 h

Type: Semester

Activation: 15/07/2023 **Deactivation:**

Goals

To familiarise students with fundamental results on sequences and series of functions, Fourier series and applications. This offer will be exclusive to interested students, optionally, and who meet the following criteria: having already attended the SMA0356-Calculus IV in person, having obtained a grade between 3.0 and 4.9 and attendance equal to or greater than 70% . Enrollment in the course will be done through the Application for Enrollment.

Responsible teacher (s) (s)

4873332 - DANIEL SMANIA BRANDÃO

Menu

Sequences and series. Fourier series.

Syllabus

Sequences. Series. Power series, Fourier series. Applications to differential equations.

Evaluation instruments and criteria

Evaluation method

Throughout the semester will be offered to the students various materials exhibitions, such as recorded classes, videos and/or class notes, with fixation through of exercise lists.

Evaluation criterion

Evaluation through face -to -face tests, works and seminars.

Recovery

Number of tests: at least one (01) and a maximum of two (02) tests. Approval Criteria: The final grade (MF) of the student who has taken recovery tests will depend on the average semester (MS) and average recovery tests (MR), as follows: $Mf = 5$ if $5 \leq mr \leq (10 - ms)$; $Mf = (ms + mr) / 2$ if $mr > 10 - ms$ $Mf = ms$ if $mr < 5$.

Basic bibliography

TEXT BOOKS:

- BOYCE, E.W., DIPRIMA, R.C. Elementary differential equations and contour values problems, 7 ed. Rio de Janeiro: LTC, 2002.
- Guidorizzi, H.L. A calculation course, vol. 4, 5 ed. Rio de Janeiro: LTC, 2002.
- Complementary:
 - Butkov, E. Mathematical Physics, Rio de Janeiro: Guanabara 2, 1988.
 - Churchill, R., Brown, J., Fourier Series and Boundary Value Problems, 4 ed. New York: McGraw-Hill, 1987.
 - Simmons, G.F. Calculation with analytical geometry, vol. 2, Rio de Janeiro: MC Graw-Hill, 1987.
 - Stewart, J. Calculation, vol. 1 and 2, 4 ed., Sao Paulo: Pioneer, 2001.
 - Swokowski, E.W. Calculation with analytical geometry, vol. 2, 2 ed., Rio de Janeiro: Makron-Books, 1995.
 - Tolstov, G.P. Fourier Series, New York: Dover, 1976.

[Additional information on the current class schedule \(in Portuguese\)](#)

São Carlos Institute of Architecture and Urbanism

Disciplines of the Institute of Architecture and Urbanism of São Carlos

Discipline: IAU0126 - Humanities and Social Sciences

Social Sciences and Humanities

Class Credits: 2

Work Credits: 0

Total workload: 30 h

Type: Semester

Activation: 01/01/2011 **Deactivation:**

Goals

Menu

Syllabus

Evaluation instruments and criteria

Evaluation method

Expository Classes - Text Reading Seminars and Debates. Individual works. Proof.

Evaluation criterion

Arithmetic average of notes in written evidence and individual works.

Recovery

Single test with a grade greater than or equal to 5.0 (five).

Basic bibliography

Basis Books: Everything that is solid in the air - The Adventure of Modernity
Marshall Berman
Paulo: Companhia das Letras, 1986 (ed.orig. 1982). Rumo to Finland Station - Essays
Edmund Wilson
Society and Culture in Modern Brazil: Companhia das Letras, 1986 (Ed. Orig. 1940)
Societies choose failure or success
of January, Ed. Record, 2005. Basic Bibliography: Argan, Giulio Carlo. Modern art. São Paulo: Companhia das Letras, 1992. Benjamin, Walter. The work of art in the age of its technical reproducibility. In chosen works: magic and time, art and politics. São Paulo: Brasiliense Publishing House, 1993.
BERNARDO, Leonardo. City History. São Paulo: Perspective Publisher, 1983.
BERNARD, Marshall. Everything that is

solid crumbles in the air. - The adventure of modernity. São Paulo: Companhia das Letras, 1986 (Ed. Orig. 1982) .briggs, ASA, editor. The Ninete Century: The Contradictions of Progress. London and New York: Thames and Huson, 1973.Burke, Peter. The Italian Renaissance. São Paulo: Nova Alexandria Publishing House, 1999 (Ed. Orig. 1987) .Childe, V. Gordon. What happened in history. Rio de Janeiro: Zahar Editores, 1981.Clark, Kenneth. Civilization. São Paulo: Martins Sources Bookstore Publisher, 1995 (Ed. Orig. 1969) .Costa, Angela Marques da and Schwarcz, Lilia Moritz. 1890-1914 - In the time of certainties. São Paulo: Companhia das Letras, 2000.DIAMOND, Jared. Collapse - How society hide failure or success. Rio de Janeiro: Ed. Record, 2005.DOBB, Maurice. The evolution of capitalism. Rio de Janeiro: Zahar Editores, 1980 (Ed. Orig. 1963) .Dupas, Gilbert. The myth of progress. São Paulo: Ed. UNESP, 2006.FRIEDMAN, Thomas L. The world is plan - a brief history of the 21st century. Rio de Janeiro: Objective, 2005.Garin, Eugenio. Science and Civil Life in the Italian Renaissance. Translation by Cecília Prada. São Paulo: UNESP Publishing House, 1996.HUBERMAN, Leo. History of man's wealth. Rio de Janeiro: Zahar Editores, 1976 (Ed. Orig. 1959) .Kranzberg, Melvin and Pursell, Jr., Carroll W. (Editors). Technology in Western Civilization - The Emergence of Modern Industrial Society: Early Times to 1900. Volumes I -II, London and Oxford: Oxford University Press, 1967 (Spanish History of La Tecnologia: La Prehistory Technique at 1900, Ed. Gustavio Gill, Barcelona, 1981). RIZEK, Cibele Saliba (orgs.). The age of indetermination - citizenship and democracy: thinking in the ruptures of politics. São Paulo: Boitempo, 2007.Toynebee, Arnold. Humanity and Mother -Terra - a narrative story of the world. Rio de Janeiro: Zehar Editores, 1979.WILSON, Edmund. Towards Finland Station - Essays. São Paulo: Companhia das Letras, 1986

[Additional information on the current class schedule \(in Portuguese\)](#)