

*Course
presentation*

2020 edition

Marcio Lobo Netto

João E. Kogler Jr.

Cognitive Systems

PSI 3560 – COGNITIVE SYSTEMS

Course presentation

Marcio Lobo Netto
João Eduardo Kogler Junior



Polytechnic School of the University of São Paulo
Department of Electronic Systems Engineering
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Summary

– First session (7:30 – 8:30)

- Course organization
- Calendar
- Participants
- Syllabus

- Coffee break

– Second session (8:30 – 10:30)

Course Organization

- Language
 - English, working proficiency level
- Classes
 - 4 classes on Tuesdays morning grouped in two sessions with coffee break intermission
 - Sessions – one on *foundations* and the other on *techniques*
- Evaluation
 - Two homework exercises (30%),
 - one final exam (30%),
 - one final project with written report and oral presentation (40%) → **report due to the final exam's day**
- Resources
 - [Moodle/STOA](#) → (with news forum + email notification)
 - [Facebook](#) → (closed group for sharing findings and discussions)
 - All academic news will be delivered via STOA and email

Calendar

month	day	part A - Foundations	part B - Techniques
FEB	18/2	Course presentation	Introduction
	25/2	no classes (carnaval)	no classes (carnaval)
MAR	3/3	F1	T1
	10/3	F2	T2
	17/3	F3	T3
	24/3	F4	T4
	31/3	F5	T5
APR	7/4	no classes (semana santa)	no classes (semana santa)
	17/4	F6 / deadline 1st homework	T6 / deadline 1st homework
	21/4	no classes - Tiradentes	no classes - Tiradentes
	28/4	no class - 1st. exams week	no class - 1st. exams week
MAY	5/5	F7	T7
	12/5	F8	T8
	19/5	F9	T9
	26/5	F10	T10
JUN	1/6	F11	T11
	9/6	F12	T12
	16/6	wrap up/deadline 2nd homework	wrap up/deadline 2nd homework
	23/6	final exam PSI3560	oral presentations
	30/6	oral presentations	oral presentations

Language proficiency

- About the expected *working proficiency level* of English usage, it means...
 - To **understand** what the instructors and colleagues say and be capable of having **conversations** with them.
 - To **read and understand** the academic materials (books, exercises, papers, shared news, academic news).
 - To **write your own** material (exercises answers, reports) so it can be understood by others.
 - To **present orally** your project at the end of the course
 - Full proficiency and fluency are *not* required.

Pre-requisites

- What kind of background is required to follow the course subject ?
- Answer: having entered this university.
 - This course is open to all areas.
 - The subject (cognitive science) is interdisciplinary.
 - The approach is usually multidisciplinary.
 - All required explanations will be presented in a very accessible way.
 - However, **some effort will be required of everyone**, both the engineering students and the non-engineering ones.

Homework level

- For the homeworks you will have to:
 - Read materials available in English language.
 - Make **critical analysis** and write down *your own* considerations on it.
 - **Propose ideas and solutions** about detected issues.
- You will **not** be required to:
 - Make calculations, develop computer programs, and develop projects.
 - More about this on the technique sessions of this course.

About the final exam

- The final exam will have two parts:
 - A part to be done in classroom
 - And a part to be done at home, individually.
 - The part to be done in classroom will be based on concepts discussed during the classes.
 - The part to be done at home may involve some extra research.

Participants

- Instructors
 - Marcio Lobo Netto
 - [Research gate page](#)
 - [LinkedIn page](#)
 - João Kogler
 - [Research gate page](#)
 - [LinkedIn page](#)
- Students
 - 16 students enrolled

Participants

- **Present yourself** and tell with some few words
 - Your name, your school and course / study area
 - Your reasons to attend this course
 - Your expectations about this course
 - **About one minute per student**
 - » You will have opportunity to tell more details in the first homework, below...
- **Homework 0 – mandatory**
 - Write down your reasons and expectations, save it in a pdf file, and upload to STOA with the tile “Homework 0 – usp_number”, up to **Mar/08**.

Syllabus

PART F – Foundations (about 2 weeks each topic)

- Foundational concepts of cognitive science (F1/F2)
 - Perception, cognition, learning, consciousness, attention, emotions, language, decision making, action planning, etc....
- Selected topics about brain and mind (F3/F4)
 - Memory, brain organization and functionalities, representation.
- Neuroscience (F5/F6)
 - The neural basis of cognitive processes and information representation and processing
 - Neuroimaging and experimental methods in neuroscience
- Social cognition (F7/F8)
 - Communication, language, emotion
- General approaches to cognitive modelling (F9/F10)
 - Dynamic systems approach, embodied cognition, embedded cognition and ecological approach, enactive approach
- Evolution and development (F11/F12)
 - Life and the emergence of cognition, developmental aspects of cognition.

Syllabus

PART T – Techniques (about 2 weeks each topic)

- The concept of cognitive system and the nature of cognition (T1/T2)
 - Cognitive agents, natural versus artificial cognition, cognitive systems, machine learning and AI, paradigms of cognition, examples of cognitive systems and applications.
- Modelling cognition (T3/T4)
 - The computational approach to cognitive modelling, representation and processes, the nature of the cognitive problem, autonomy, knowledge and conceptual systems
- Artificial Intelligence and cognitivism (T5/T6)
 - The symbolical approach, symbol systems, artificial general intelligence.
- Machine learning and the connectionism (T7/T8)
 - Statistical learning, traditional neural network approach, deep learning, advanced networks
- Adaptive systems (T9/T10)
 - Adaptation, cellular automata, artificial life, morphogenesis
- Cognitive architectures (T11/T12)
 - Classes of cognitive architectures, examples, cognitive robotics

References

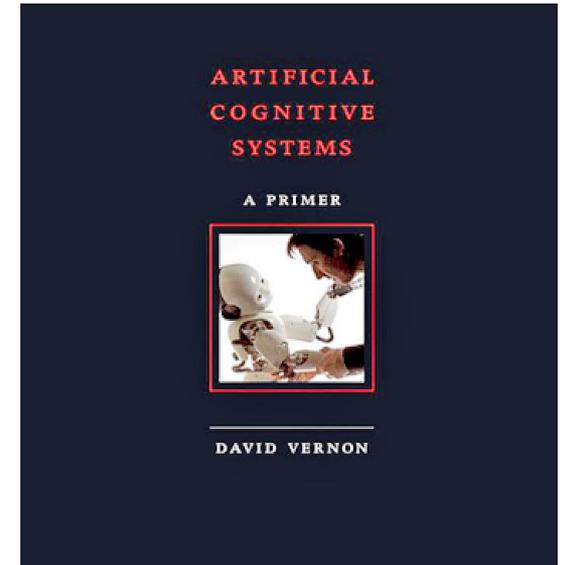
- Textbooks

- Artificial cognitive systems – a primer
 - David Vernon, MIT Press, 2014
- Fundamentals of cognitive neuroscience – a beginner's guide
 - Bernard Baars and Nicole Gage, Elsevier, 2013



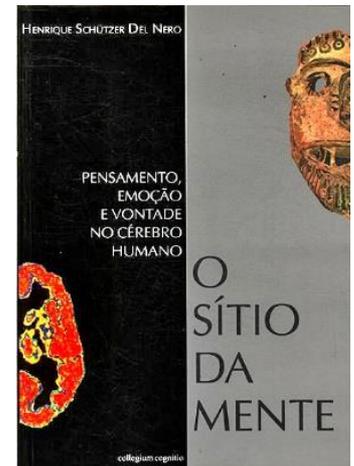
- Additional references

- The Cognitive Neurosciences
 - Michael Gazzaniga , MIT Press, 4th Ed, 2009
- The MIT Encyclopedia of Cognitive Sciences
 - Robert A. Wilson and Frank C. Keil, MIT Press, 1999
- Foundations of Cognitive Sciences
 - Michael Posner , MIT Press, 2001
- Neural Networks and Learning Machines
 - Simon S. Haykin, Prentice Hall, 2010
- Artificial Intelligence, a Modern Approach
 - Stuart Russel and Peter Norvig, Prentice Hall, 3rd Ed, 2010



Historical overview

- Previous courses
 - Cognitive Sciences were originally introduced at USP / POLI by Prof. Henrique Schutzer Del Nero
 - Followed from a study/working group he started at Advanced Studies Institute (IEA)
 - Then he moved to POLI Electrical Eng. and brought here this research group as a continuous effort in the area
 - He offered also a graduate course on Cognitive Science in the PhD program of POLI Electrical Eng.
- Recently, with the EC3 reformulation of the undergrad curriculum of POLI courses, it became viable offering this new course as an optional subject for students of all areas.
 - First offering was on 2018



Thank you

Following 2nd session