e-Learning in Bioinformatics

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European Molecular Biology Network
Red Iberoamericana de Bioinformática
Red Temática Nacional de Bioinformática
Asia-Pacific Bioinformatics Network

Medicine

- All science is either physics or stamp collecting
  - Rutherford, Ernest (1871-1937)
- We can only understand disease at the molecular level
  - Alberto Sols (1917-1989)

Molecular Medicine

- Biochemistry
- Biphysics
- **Genetic medicine**
- **Molecular basis of disease**
- **Cellular basis of disease**
- **Biological aspects of disease**
- **Pharmacogenomics**

Molecular Biology

- A young science that flourished in the last two decades
  - Genetics
  - Proteins
  - Molecular interactions
  - Cellular integration
  - Population dynamics
  - Evolution

Bioinformatics

- For the Biologist
  - Analysis of experimental data from Molecular Biology
  - Understanding Biological processes
- For the physician
  - Interpretation of test results
  - Diagnose and prognosis
- For the pharmaceutical
  - Drug selection and study

Bridging the gap

- Molecular Biology is increasingly being applied in Medicine
  - Just follow MB experimental methods
  - What about data interpretation?
    - Bioinformatics has grown for the Biologist
    - BI methods could be applied directly by the Physician
  - But **literature is Biologist-oriented**

An example

Evolution

- For the Biologist
  - How did these species/genes originate?
    - How did these species/genes evolve from a common ancestor to reach their current status?
    - *I want to know what is this!*
- For the Physician
  - How does this disease/pathogen change?
    - How does it spread?
    - How does it develop new pathologies?
    - How does it develop resistances?...
    - *I know what it is, Iwant to know what makes it special!*

Avian Flu

- From: Identification of human-to-human transmissibility factors in PB2 proteins of influenza A by large-scale mutual information analysis. **InCoB2007** *Hong Kong, 28th August 2007*. **Olivo Motto**.

Can H5N1 viruses spread amongst humans?

Human Sequences (H2H)

H2H variants show remarkable historical stability

Location of characteristic sites in binding domains suggests complex interactions are involved in adaptation to H2H transmission

Both current lineages (H1N1, HxN2) have evolved from the same source (1918 Spanish Flu)

The Spanish Flu (La Gripe) H1N1

- 20-40 *million* dead in one year
- 50-100 million dead in total
- 20% world population infected
- 8 million deaths in May in Spain
- death within hours

Avian sequences (H5N1)

- Avian strains rarely show any H2H mutation
- Spanish Flu had 5 H2H mutations
- H5N1 repeatedly exhibits H2H mutations, but they do not "stick"
  - H5N1 not becoming H2H
- Reassortment is unlikely - and how pathogenic?

Fighting Avian Flu

- New Grid technologies are finding its way into Bioinformatics and Health informatics
- Drug screening initiatives are speeding up the path to discovery of new therapies.

Other applications

- Identification of mutant genes
- Diagnosis of genetic diseases
- Prognosis of propensity to disease
  - Genetic/molecular counsel
- Personalized drug therapy
- etc...

- Note that all of them have a wider economic and social impact (travel, insurance, politics, commerce, discrimination...)

So, where is the problem?

Getting closer

- Bioinformatics has grown hand-by-hand with Molecular Biology
  - Most tools and documentation are oriented to the Biological problem
  - Indeed, most of them are oriented to the Bioinformatician (Theoretical Life Scientist?)
- Medical Doctors need to get acquainted with a well-stablished methodology
  - Using a *foreign* language

Solving the problem

Adapt to MD needs

- Translate tools and docs to *medicalese*
- MDs need meaningful data to guide decisions
  - Develop/adapt tools to MD needs
  - Subject of a submitted COST proposal
- Train MDs in the *interpretation* of analytical results

Training in Bioinformatics

- Still inmature:
  - Lack of professionals
  - Wide range of subdisciplines
- Bioinformatics is still a young discipline
  - Comprehensive training is difficult to deliver
- Either
  - Experts *at* different institutions cooperate
  - Or only specialized training is delivered

e-Learning

- e-Learning allows pooling of training resources at different locations
- EMBnet has started a public portal for
  - Sharing (CC) training materials
  - Cooperative training
  - Delivering remote education

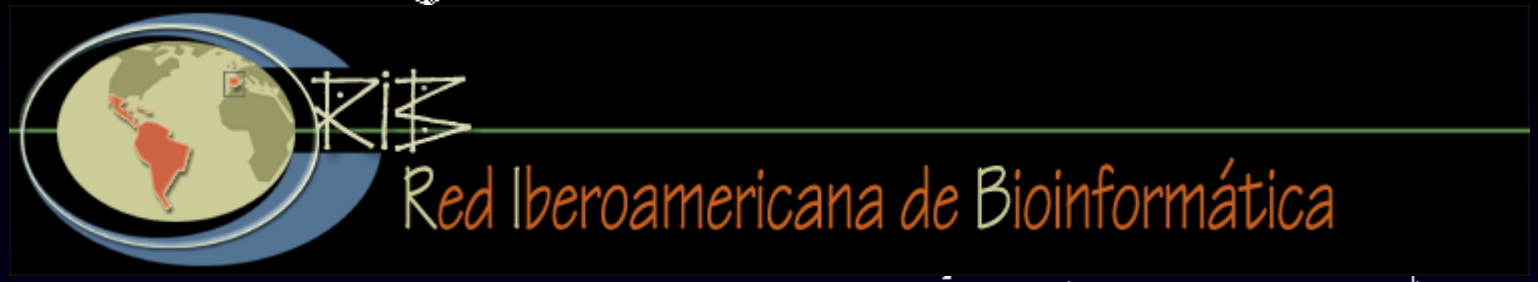
- http://edu.embnet.org/

EMBnet

- EMBnet is a group of ~40 collaborating nodes providing support to Life Scientists
  - National nodes provide bioinformatics support to local scientists
  - Specialist nodes provide expertise in highly specialized areas
  - Other nodes collaborate on special areas
- There are european as well as non-european nodes (Africa, America, Asia, Australasia)

Growing collaboration

- Despite its size, EMBnet alone can not cover all the needs for e-Learning in Bioinformatics
- To be truly useful such a resource must cover the needs of
  - Most training institutions
    - At different countries, cultures, etc...
  - Most Bioinformatics fields
    - Sequence Analysis, Evolution, Structural Biology, *omics...
  - Most users
    - Biologists, Medical Doctors, Pharmacologists, etc...



- An international network of cooperating nodes oriented to **Iberian** (Spain and Portugal) and related **American** (Central and South American) countries.
- Goal is to **promote development of Bioinformatics** in the region.
- Many **common members** with EMBnet

- Joined the initiative in June-2007

The Asia Pacific Bioinformatics Network

Endorsed By APAN TEL APAN ISCB

- More than 20 organizational and 300 individual members from over 12 countries in the region
- A non-profit, non-governmental, international organization.
- It focuses on the promotion of bioinformatics in the Asia Pacific Region

- Joined the initiative in August 2007

- The national network for bioinformatics is the communication and community-building tool for our bioinformaticians and computational biologists. It has an open scope, as
  - it represents the different trends in bioinformatics and computational biology,
  - it includes people from different professional and academic origin, and
  - it participates in the organization of scientific activities, dissemination and training
- Joined initiative in February 2008

http://edu.embnet.org

EMBnet

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English (en)

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For an introduction to Bioinformatics for Life Scientists, you may also visit our sister **EMBER portal** (new users should 'create an EMBER account' to set their own login ID).

You are welcome to use and contribute to this site

Calendar

◀ April 2008 ▶

Mon	Tue	Wed	Thu	Fri	Sat	Sun
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Site news

New materials on Biostatistics

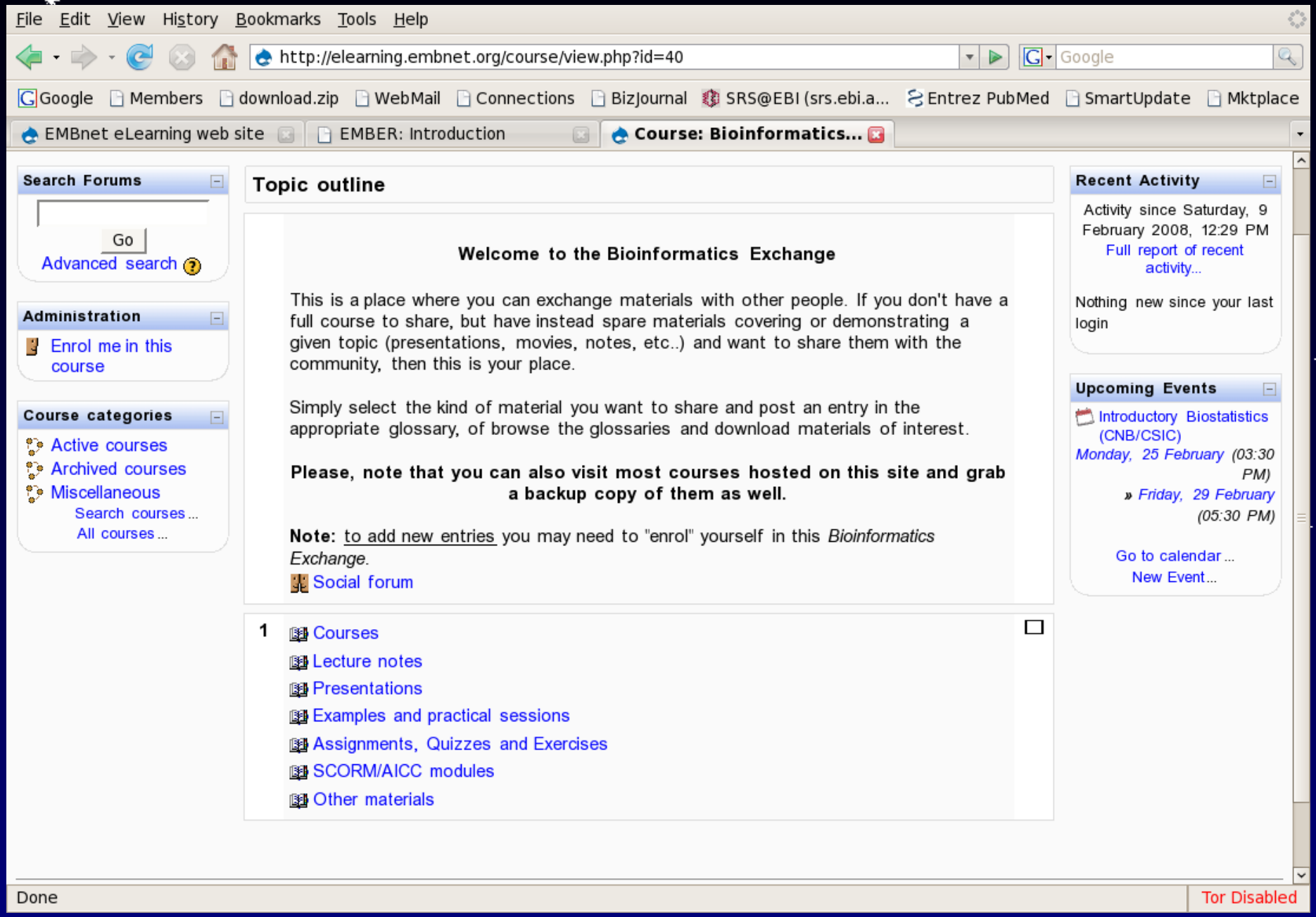
by Admin User - Monday, 25 February 2008, 01:17 PM

The course on Introductory Biostatistics has been updated and expanded for its use at the Spanish EMBnet node this week.

In addition we have added to the exchange repository new materials on statistics from Universidad de Cádiz in Spain released under GNU licenses.

http://elearning.embnet.org

- A sharing point for training materials
  - With advice to authors
- An e-learning place to support courses
  - Open to guest and registered users
  - Multilingual (EN, ES, CN...)
  - Wide range of courses available
  - Used in real-world training
  - All materials available for download/replication/use
- Creative Commons licensing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This is a place where you can exchange materials with other people. If you don't have a full course to share, but have instead spare materials covering or demonstrating a given topic (presentations, movies, notes, etc..) and want to share them with the community, then this is your place.
Simply select the kind of material you want to share and post an entry in the appropriate glossary, of browse the glossaries and download materials of interest.
Please, note that you can also visit most courses hosted on this site and grab a backup copy of them as well.
Note: to add new entries you may need to "enrol" yourself in this Bioinformatics Exchange.
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Recent Activity
Activity since Saturday, 9 February 2008, 12:29 PM
Full report of recent activity...
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Upcoming Events
Introductory Biostatistics (CNB/CSIC)
Monday, 25 February (03:30 PM)
» Friday, 29 February (05:30 PM)
Go to calendar ...
New Event ...
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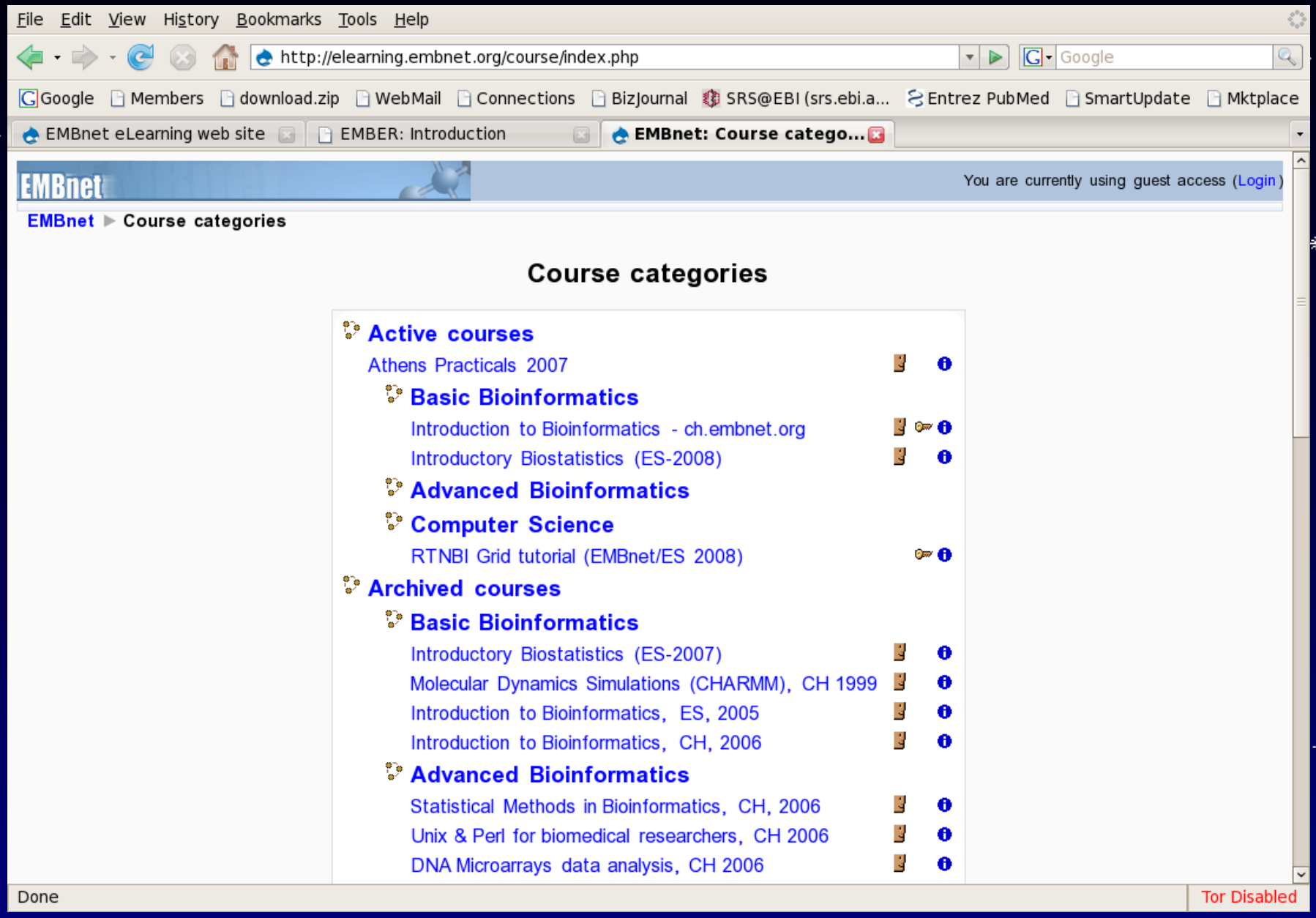
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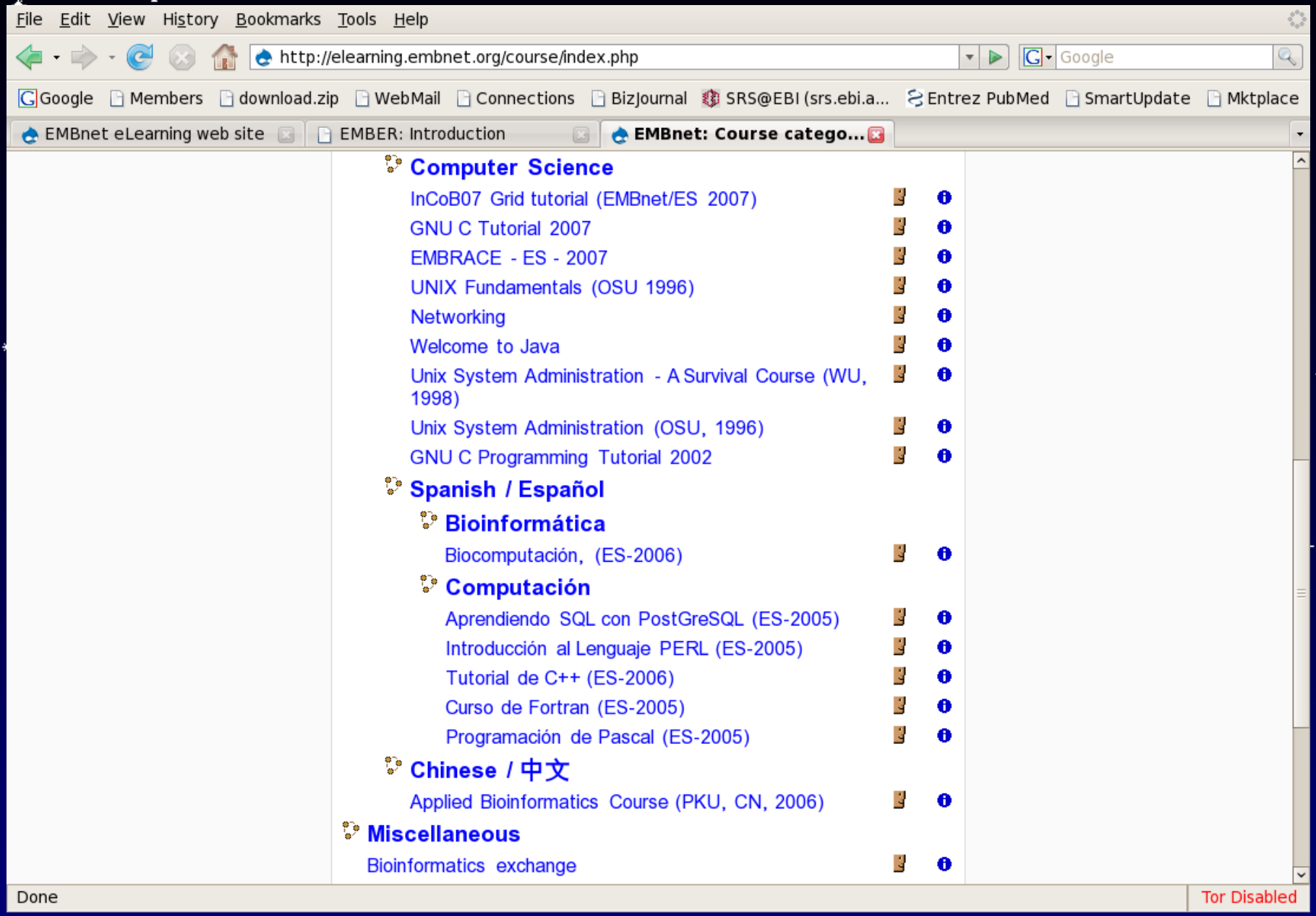
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Welcome to Java
Unix System Administration - A Survival Course (WU, 1998)
Unix System Administration (OSU, 1996)
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Bioinformática
Biocomputación, (ES-2006)
Computación
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Applied Bioinformatics Course (PKU, CN, 2006)
Miscellaneous
Bioinformatics exchange
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Topic outline

Statistical Methods in Bioinformatics 2006

SKMB

Course objectives

The purpose of this course is to introduce students to methods from probability theory, statistics, and the theory of stochastic processes in the context of bioinformatics applications (e.g. DNA and protein sequence analysis, microarray data analysis, phylogeny). Major topics will include a general introduction into Bayesian statistical inference, clustering and classification, regression methods, stochastic processes and Markov chains, and evolutionary models.

Attendees will work through short tutorial on the topics discussed in the class.

Audience

Familiarity with basic concepts from statistics and knowledge of calculus and linear algebra are prerequisites to fully benefit from this course.

A basic knowledge of Unix is required for the practical sessions of the course.

News forum

Latest News

Add a new topic...
(No news has been posted yet)

Upcoming Events

Introductory Biostatistics (CNB/CSIC)
Monday, 25 February (03:30 PM)
» *Friday, 29 February (05:30 PM)*

Go to calendar...
New Event...

Recent Activity

Activity since Saturday, 9 February 2008, 12:37 PM
Full report of recent activity...

Nothing new since your last login

A long way to go...

- A new initiative in its early phases
- Need to increase coverage for
  - More topics
  - More languages
  - More disciplines
  - More communities
    - Physicans (MD)
    - Chemists (Pharma)
    - Biology (other than MB)
  - etc...

In one word

It’s all about people

We need your help

- To develop new materials
  - Oriented to medical doctors
- To develop new tools
  - Oriented to medical practice
- To benefit from our work
  - Use
  - Contribute
  - Spread
  - Support

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