



“General Biotechnology” - Advanced introductory course

Dear Prospective Course Participant,

Thank you for your interest in the Advanced Literacy molecular biology course for non-biologists.

Should you decide to attend, be ready for an intense journey into a fascinating science! It would be both an honor and a pleasure to be your guide.

The LOROCH Biotech courses have been offered to professionals in many different fields (natural sciences, social sciences and humanities) and experience shows that they invariably help non-biologists become literate in modern biology and biotech in record time (two days of hard work!). Over 600 participants from all professional venues (scientists and non-scientists)

At the same time, every course is a little different every time. Why? Because this course is **yours** and will be adapted to answer **your learning needs and interests**. Therefore, should you be interested in a particular issue or topic that is missing from the course outline, please do not hesitate to let me know. I am constantly working on updating the contents of the course so it is almost always a good time to integrate your wishes and concerns.

You will find below a course overview which should give you a pretty good idea as to what to expect. The definitive program, directions and other practical information are sent approximately two weeks prior to a specific course session.

I hope you will be joining us for two dense but fun days. In the meantime, should you have any questions, please feel free to contact me at your convenience. I would be delighted to be of assistance.

Kind regards,

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Schedule (both days):

- 8.30 Your course instructor is here to greet you
- 9 :00 – 10:30 Course
- 10:30 - 10:45 Coffee break
- 10:45 -12:30 Course
- 12:30 -13:30 Lunch
- 13:30 -15:00 Course
- 15:00 - 15:15 Coffee break
- 15:15 – 18:00 Course



Course overview

Day 1 - Assembling the toolbox

The first day is essentially a lecture-based course that introduces all the key discoveries and inventions that led to the “biotechnological revolution” (which is still at its very beginning !). Each lecture lasts approximately 15-20 minutes, and is preceded and followed by question-and-answer periods and a few surprises. The topics will be illustrated by “case vignettes” when appropriate. Each participant receives a CD with course notes, animations and a glossary.

A. Fundamentals

1. The birth of molecular biology
2. The size and numbers of the objects that molecular biologists study
3. Three archetypes of living organisms: bacteria, animals, viruses
4. Chemical bonds important in life and the building blocks of macromolecules.
5. The three types of biological approaches (molecular biology, genetics, biochemistry)
6. BREAKING NEWS of April 9, 1952 : the genetic material is made of DNA !
7. BREAKING NEWS of April 25, 1953 : DNA is a double helix!

B. DNA knowledge and basic applications

8. DNA: the immortal and primary reservoir of information
9. BREAKING NEWS of October 1952 : DNA is mobile !
10. DNA as a living macromolecule
The glorious and sad history of antibiotics
11. BREAKING NEWS of November 1973 : Genetic engineering is a reality !
12. Understanding DNA structure and function for diagnostics
A case study in forensics and diagnostics.
13. DNA sequencing. A formidable technological challenge.

C. Gene expression

14. RNA: the message that comes with its toolbox
15. BREAKING NEWS of May 15, 1961: The genetic code is cracked!
16. Artificial genes: the technology of democracy.
17. Proteins: the bricks and the machines

Day 2 Biotechnology and biology for a better world

The second day is really about biotechnologies.: white/grey (industrial), green (agricultural) and red (medical). It is organized around case studies chosen according to your interests and wishes. A tentative outline is below (but we can change a few topics, as more case studies are available):

A. Review of material from Day 1

1. The fundamentals of gene expression

B. White-grey biotechnology

2. Recombinant chymosin : The making of truly vegetarian cheese.

C. Green biotechnology

3. Engineering Insect resistant plants: dangerous or innocuous?
4. The Golden Rice project and the occasional absurdity of the principle of precaution

D. Red biotechnology

5. Recombinant insulin and pretty nurses save lives
6. Fundamentals of the biology of cancer: studying tens of thousands of genes at once
7. The Oncomouse and the year 2007 Nobel prize: knock-in and knock-out mice.
8. Antibodies: some very special proteins to diagnose, treat and sometimes cure.
Monoclonal antibodies (murine, chimeric, humanized, human), fragment antibodies, antibody conjugates.
9. The incredible promise of stem cells and cell therapies: this is not science fiction anymore!
10. The modern therapeutic arsenal: small molecules vs. biologics vs. cells
11. Conclusion: gene expression, epigenetics and multiple levels of control