

Introduction

The Educational Module Resource (EMR) consists of 21 lectures, accompanying notes for the lecturer and direct links to the references used; it is intended to be a resource that can be used by a lecturer in order to develop one or more **lectures, seminars, roleplays or other teaching aids** suitable for the course he or she is presenting. The EMR is provided as open source material and it is hoped that where possible lecturers who use this material will contribute to its development, also using a web-based publication platform. The references used are kept to a minimum number for each of the lectures and only those that are widely accepted as being important for the arguments developed are used (for example, the US National Academies Fink and Lemon-Relman Reports are used in relation to the discussion of experiments of possible dual-use concern); on the other hand, we have tried to include references to a wide spectrum of points of view and materials, especially for the sections dealing with ethics or topics of discussion.

The lecture sequence illustrates one of a number of possible ways in which this subject can be approached, but each approach would be equally solid depending on the local circumstances. It is also expected that lecturers will not have space to use all or even many of the lectures in their entirety, but tests proved that it was quite possible to condense material from several lectures into a single presentation.

The EMR has been developed by an interdisciplinary group of professional life scientists and social scientists specifically to help lecturers giving university courses. As this material could be covered in, for example, bioethics or biosafety courses we have tried not to over-emphasise technical material, even if inputs from life scientists would be important for some lectures to be fully appreciated and effectively presented. We have included some more detailed lectures to cover specialist scientific topics.

The proposed module should privilege as much as possible an interactive approach with the students, both to find an interesting way to engage them on non-scientific subjects and because many of the issues are complex ethical questions referring to the life sciences. So, raising debates on the dual-use issues, to think of possible misuses of the researches in which they have direct experiences, asking students, essay writing or even nonconventional teaching like role playing would be important means in addition to regular lectures.

Why did we build up an ERM for educating and raising the awareness of life scientists and biotechnologists on biosecurity issues and dual-use risks and debates? Firstly, because many assessments from international organizations (OECD, WHO, European Commission, the BTWC inter alia), scientific community and NGOs proved that life scientists have little information on these issues; **secondly**, since there is an ongoing policy making process that has little exchanges with the life science scientific community, biologists would be affected by these policies in their professional lives and should be engaged and informed of the discussions; **thirdly**, because instilling concepts related to scientific responsibility during the formative period can contribute to the creation of a “culture of responsibility”. **Fourthly**, the international scientific community (InterAcademy Panel as well as more than 30 scientific journals) is considering introducing oversight of scientific research and has introduced a “biosecurity review” as part of its publication criteria.

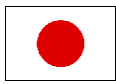
The purpose of science is to benefit human life and conditions, and life sciences are hugely contributing to this, and will increasingly in the future. But in some cases, research and public health activities can also have “**biosecurity**” aspects, require “**biosafety**” precautions or present “**dual-use**” risks. Taking vaccine research as example, the study of vaccine design or response systems to disease outbreaks could require to isolate, identify and even enhance the virulence of a pathogen, or to induce mutations in order to test how could technology respond.

But it has to be considered that what is described above, beneficial and perfectly legitimate, could be potentially also used as the path to build and to deliver biological weapons. In fact, biological weapons existed in history and have been developed in huge military programs as well as used in war; and known (and less known) episodes of bioterrorism have occurred. Biological weapons can be categorized in different “generations”, and potential misuse of new technologies could lead to entire novel scenarios. An International Prohibition Regime against non-peaceful use of life sciences and technologies is in place (with international treaties, and communitarian initiatives and national legislative implementations and obligations). Misuse of biological agents and technologies for purposes that are different from the peaceful and beneficial ones for which they are intended, is of course an issue of ethical concern, and bioethics have begun recently to treat it. “Dual-use” in particular is an issue of which scientists should be aware, and participate on discussions on it; some examples of “dual-use” experiments will be presented. The creation and the improvement of a “Web of Prevention” policies to support the norm of non-use for hostile purposes is essential.

We have also included a small number of background briefing papers and extended lecture notes on topics on which life scientists are less likely to have experience.

The following pages show how the EMR works.

Dual-Use Bioethics Education Module Resource (EMR)



**National Defense
Medical College**



**UNIVERSITY OF
BRADFORD**
MAKING KNOWLEDGE WORK



IWG-LNCV

1. Module Objective

The objective of the module is to provide an educational module resource which meets higher education learning, teaching and assessment standards to ensure transfer of learning outcomes such as knowledge and understanding, subject-specific skills, personal transferable skills, and levels of knowledge transfer and modes of assessment appropriate to its assimilation in to University curricula.

2. What is it? 21 lectures

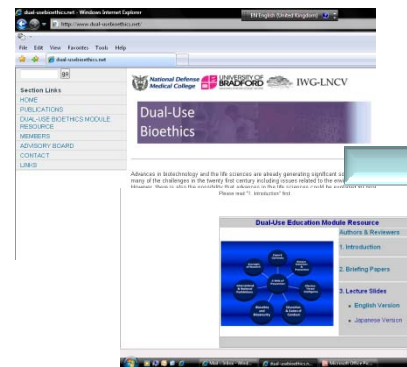
- A. Introduction and Overview : Lecture 1
- B. The Threat of Biological Warfare (BW) and Biological Terrorism (BT) and the International Prohibition Regime: Lectures 2-10
- C. The Dual-Use Dilemma and the Responsibilities of Life Scientists : Lectures 11-18
- D. National Implementation of the BTWC: Lectures 19-20
- E. Building an Effective Web of Prevention to Ensure Benign Development: Lecture 21

3. Open Source

The EMR is *freely and openly* available educational material.

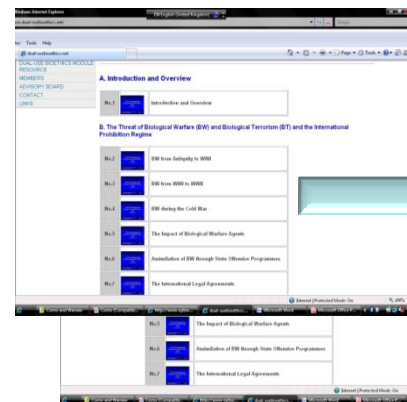
4. Where is it?

(<http://www.dual-usebioethics.net/>)



4.1 Front page of the EMR

- Introduction
- Authors
- Lecture slides
- Previous UN presentations about the EMR



4.2 EMR lecture slides

21 basic lectures plus 'applied versions' of selected lectures specifically developed by life scientists to emphasise a scientific perspective.

All lectures are available both in English and Japanese.

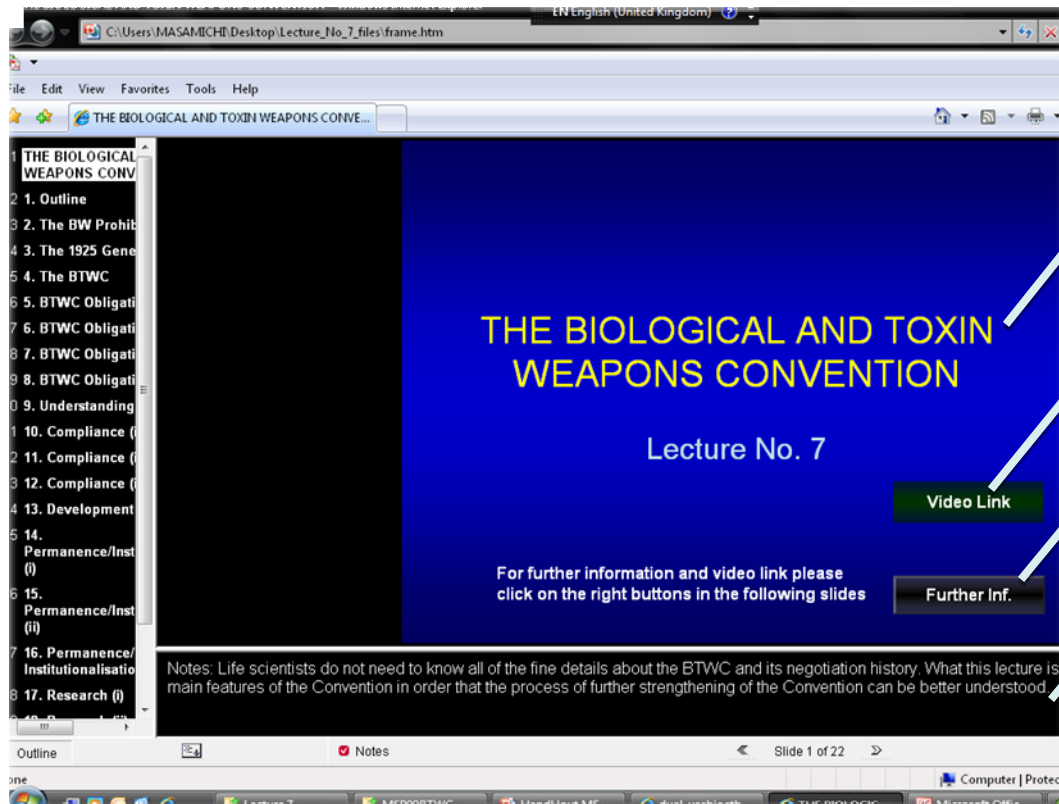
5. How to use it

Read the 'Introduction' on the front page of the EMR first, then go to EMR: 'Lecture Slides'.



Funding: Under the auspices of the UK Prime Minister's Initiative on Research Cooperation we have a British Council award for the development of this resource.

Dual-Use Bioethics Education Module Resource (EMR) (<http://www.dual-usebioethics.net/>)



6. How to use it: Basic elements of the EMR

Main texts: Essential content of the lecture

Video links: Additional video content

Further information: Additional content (official documents, literature and pictures)

Notes: Elaboration of essential content of each lecture slide

References

Questions

6.1. **Sample essay questions and references** are provided at the end of each lecture.

7. How to use it: *"No one size fits all"*

Since every academic course has different educational aims and teaching objectives, the EMR can be tailored to fit into specific academic contexts.

Example: Fitting the EMR into education at the National Defense Medical College (NDMC), Japan.

7.1 Original lecture No. 7 (The Biological and Toxin Weapons Convention and lecture No. 8 (Development of the BTWC: 1980-2008) of the EMR were integrated into a single lecture with additional information for the *specific educational context of the College.*

THE BIOLOGICAL AND TOXIN WEAPONS CONVENTION

Lecture No. 7

Video Link

For further information and video link please click on the right buttons in the following slides

Further Inf.

From EMR
To NDMC EMR

THE BIOLOGICAL AND TOXIN WEAPONS CONVENTION (BTWC)



Bradford & NDMC Team

Photo credit: Prof. Yasushi Kobayashi of the NDMC