
Biological Safety
Assoc. Prof. Dr. Ilker BUYUK
Wednesday, March 13, 2019
What Is Biological Safety?
A Biological Safety is :
Bio Safety
Biosafety is related to several fields :
Biosafety Level 1
Biosafety Level 2
Biosafety Level 3
Biosafety Level 4
Thank You ...
Biological Safety
What Are Biosafety Cabinets ?
A Biosafety Cabinets Are :
Biosafety cabinets are used to provide primary containment in the laboratory when the investigator is using potentially infectious materials
Biosafety is related to several fields :

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What Is Biological Safety?

Bio Safety

A Biological Safety is :

The prevention of large-scale loss of biological integrity, focusing both on ecology and human health.

These prevention mechanisms include conduction of regular reviews of the biosafety in laboratory settings, as well as strict guidelines to follow.

Biosafety is used to protect us from harmful incidents.

Biosafety is related to several fields :

Ecology
Synthetic Biology
Medicine
Chemistry
Agriculture

Biosafety Level :

High Risk Microbes
BSL-4
BSL-3
BSL-2
BSL-1
Low Risk Microbes

A biosafety level is a level of the biocontainment precautions required to isolate dangerous biological agents in an enclosed laboratory facility. The levels of containment range from the lowest biosafety level 1 (BSL-1) to the highest at level 4 (BSL-4).

- Any Question ?
Thank You ..

Biosafety level 4

4

Biosafety level 3

3

Biosafety level 2

2

Biosafety level 1

1

Biological Safety

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There Are 3 Types Of Biological Safety Cabinets :

Class I :
Class II :
Class III :

Biosafety level 3

Reference :

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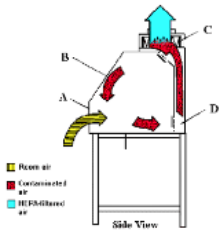

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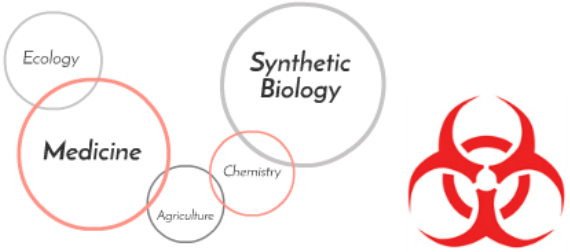

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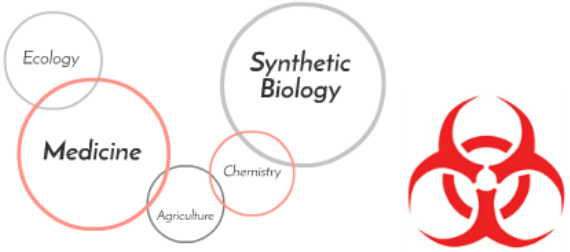

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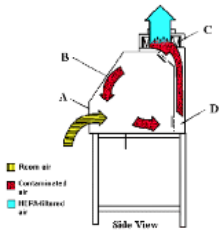

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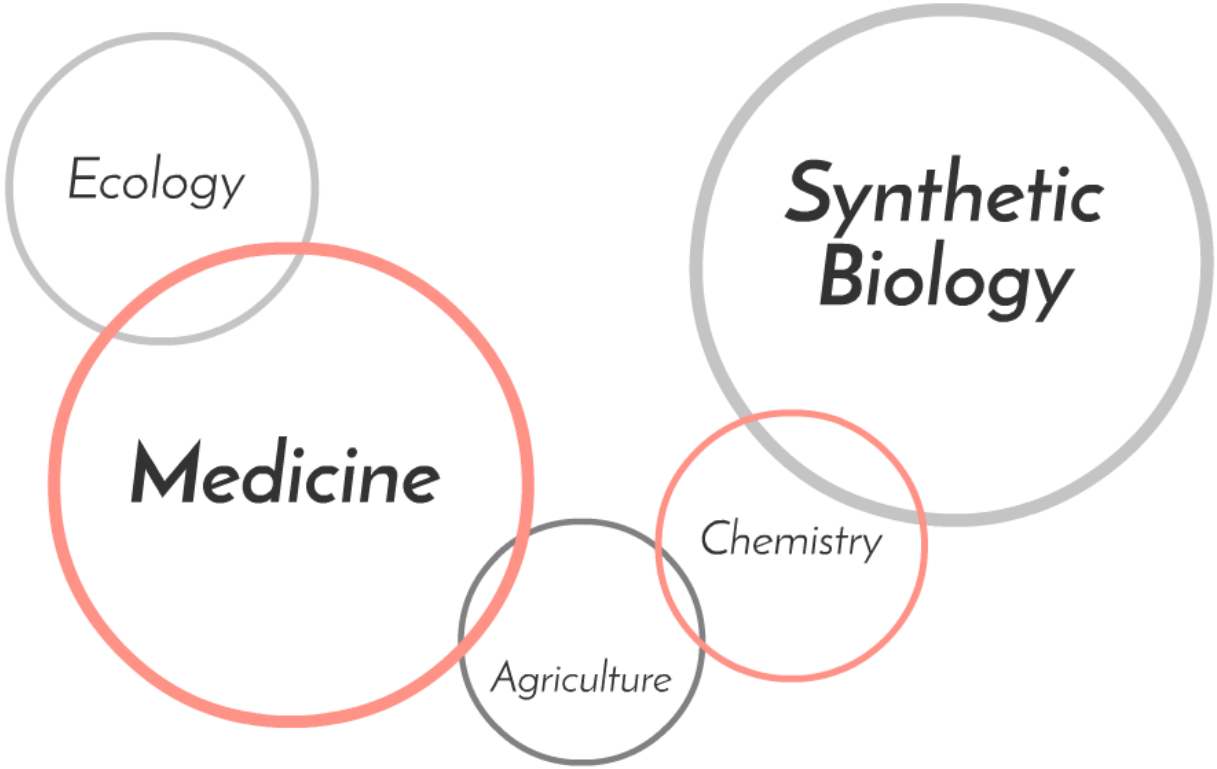

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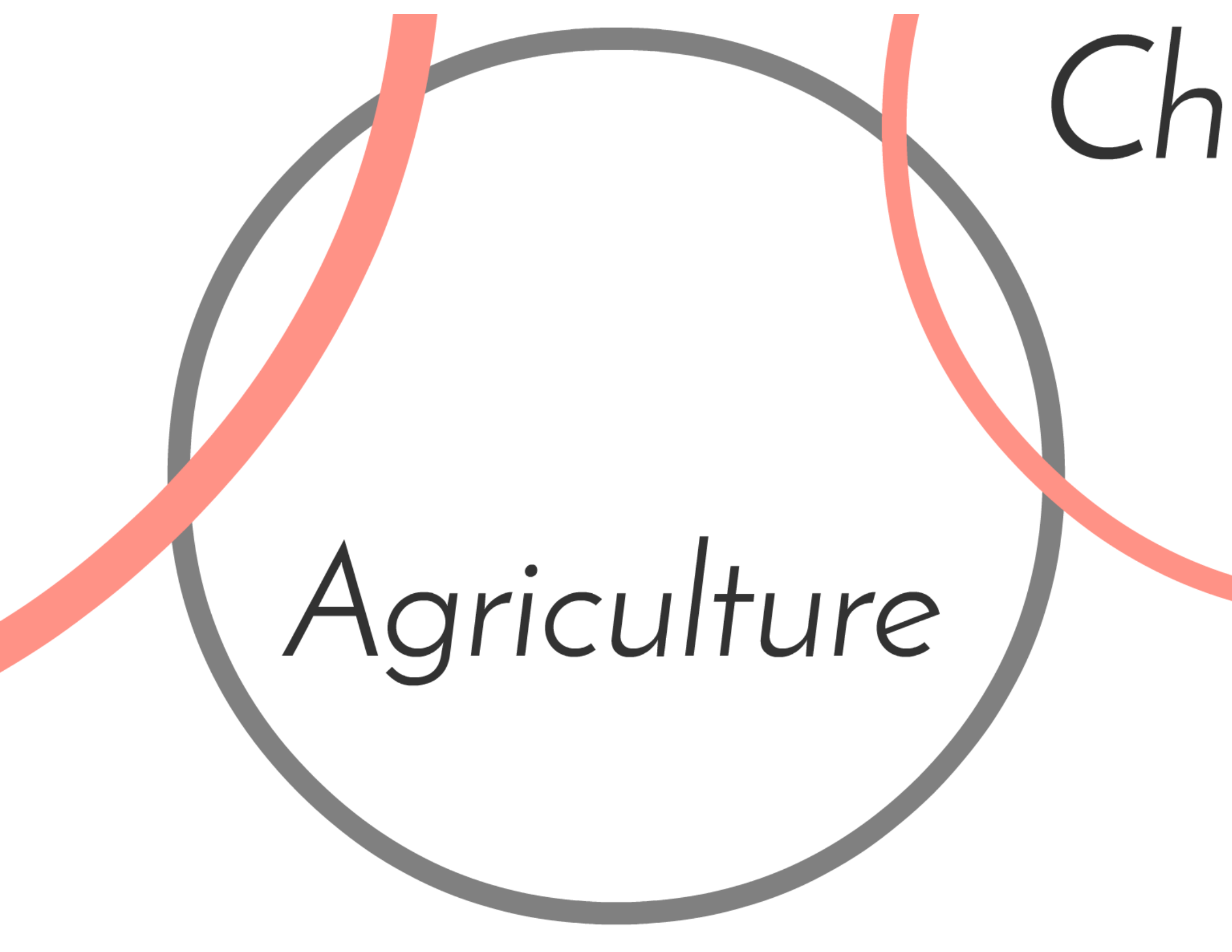
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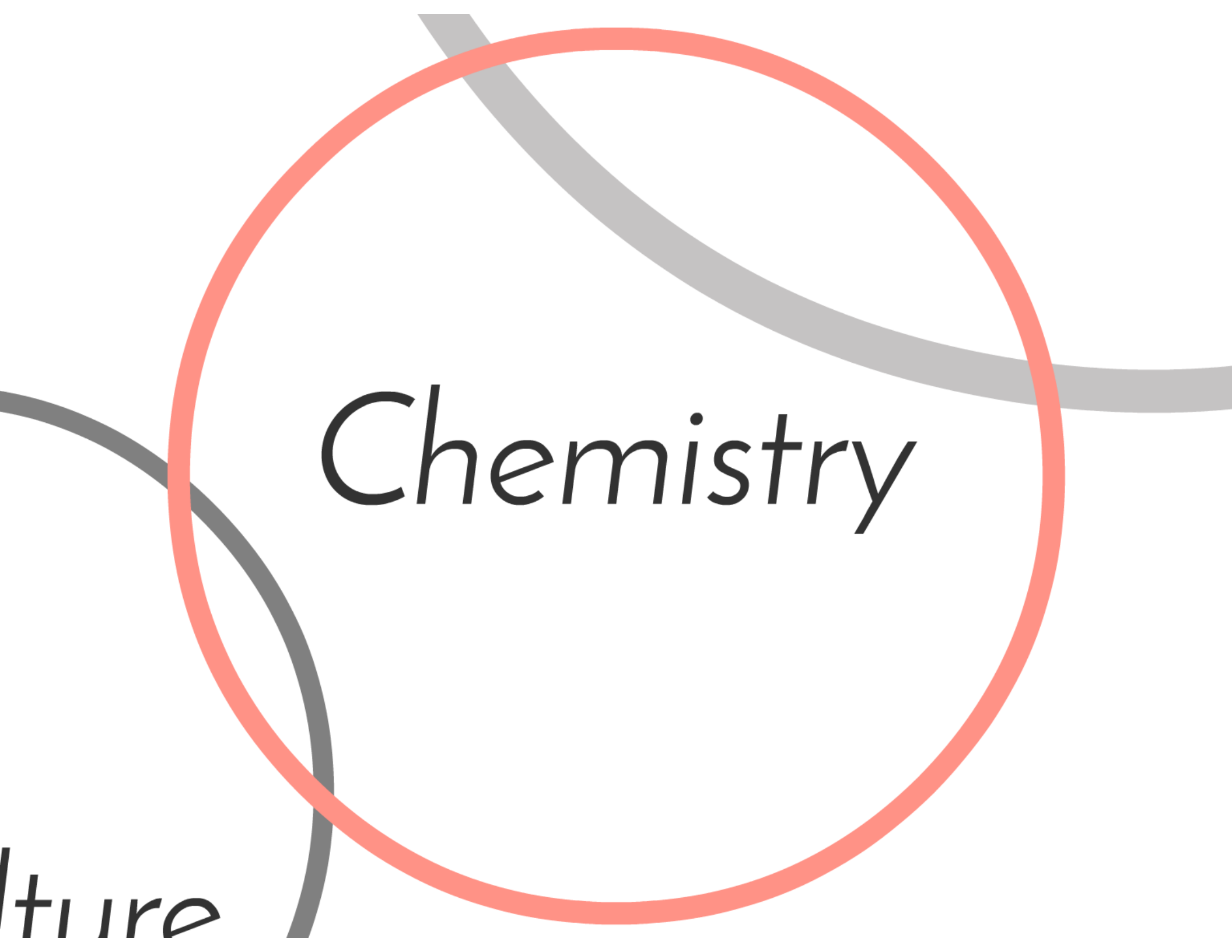
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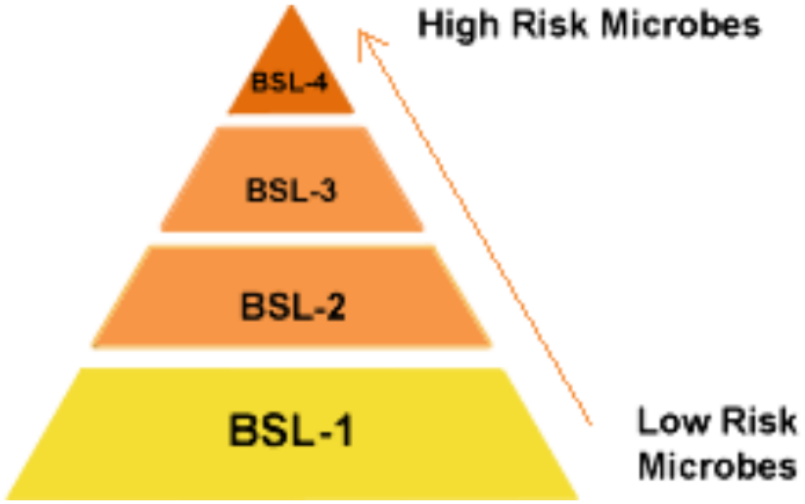

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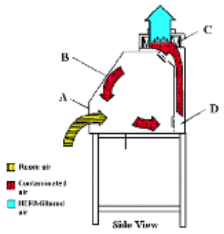

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Biosafety level 1

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This level is suitable for work involving well-characterized agents not known to consistently cause disease in healthy adult humans, and of minimal potential hazard to laboratory personnel and the environment .
Research with these agents may be performed on standard open laboratory benches without the use of special containment equipment and it is not necessary for Biosafety Level 1 labs to be isolated from the general building

It includes several kinds of bacteria and viruses including canine hepatitis, non-pathogenic Escherichia coli, as well as some cell cultures and non-infectious bacteria.

At this level, precautions against the biohazardous materials in question are minimal and most likely involve gloves and some sort of facial protection.

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Biosafety level 2

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This level is similar to Biosafety Level 1 and is suitable for work involving agents of moderate potential hazard to personnel and the environment. It includes various bacteria and viruses that cause only mild disease to humans, or are difficult to contract via aerosol in a lab setting, such as hepatitis A, B, and C, orthopoxviruses (other than smallpox), influenza A, Lyme disease, Salmonella, mumps, measles

.. BSL-2 differs from BSL-1 in that: laboratory personnel have specific training in handling pathogenic agents and are directed by scientists with advanced training; access to the laboratory is limited when work is being conducted; extreme precautions are taken with contaminated sharp items; and certain procedures in which infectious aerosols or splashes may be created are conducted in biological safety cabinets or other physical containment equipment.

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Biosafety level 3

This level is applicable to clinical, diagnostic, teaching, research, or production facilities in which work is done with indigenous or exotic agents which may cause serious or potentially lethal disease after inhalation.
It includes various bacteria, parasites and viruses that can cause severe to fatal disease in humans but for which treatments exist, such as, Leishmania Donovani, SARS Coronavirus, Rabies Virus, Yellow Fever Virus, West Nile Virus.

Laboratory personnel have specific training in handling pathogenic and potentially lethal agents, and are supervised by competent scientists who are experienced in working with these agents.
- *All procedures involving the manipulation of infectious materials are conducted within biological safety cabinets, specially designed hoods, or other physical containment devices, or by personnel wearing appropriate personal protective clothing and equipment. The laboratory has special engineering and design features.*

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This level is required for work with dangerous and exotic agents that pose a high individual risk of aerosol-transmitted laboratory infections, agents which cause severe to fatal disease in humans for which vaccines or other treatments are not available, such as Ebola virus, Lassa virus, Crimean-Congo hemorrhagic fever, and various other hemorrhagic diseases.

This level is also used for work with agents such as smallpox that are considered contagious enough to require the additional safety measures, regardless of vaccination availability. When dealing with biological hazards at this level the use of a positive pressure personnel suit, with a segregated air supply is mandatory. The entrance and exit of a level four biolab will contain multiple showers, a vacuum room, an ultraviolet light room, and other safety precautions designed to destroy all traces of the biohazard.

Members of the laboratory staff have specific and thorough training in handling extremely hazardous infectious agents and they understand the primary and secondary containment functions of the standard and special practices, the containment equipment, and the laboratory design characteristics.

Access to the laboratory is strictly controlled by the laboratory director.

The facility is either in a separate building or in a controlled area within a building, which is completely isolated from all other areas of the building

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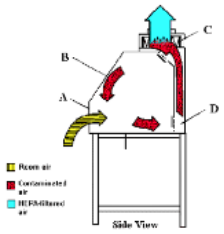

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There Are 3 Types Of Biological Safety Cabinets :

Class I :

Class II :

The Class II vertical laminar flow biological cabinet is an open front, ventilated cabinet.
This cabinet provides a HEPA filtered, recirculated mass airflow within the work space. The exhaust air from the cabinet is also filtered by HEPA filters.
Thus, the Class II biosafety cabinet will provide personnel environment and product protection.
Wide HEPA filters are effective for trapping particulates and infectious aspects, these filters will not capture volatile chemicals or gases.

Class III :

Biosafety level 3

Personnel protection provided by Class I and Class II cabinets is dependent on the inward airflow. Since the face velocities are similar, they generally provide an equivalent level of personnel protection. The use of these cabinets alone, however, is not appropriate for containment of highest-risk infectious agents because aerosols may accidentally escape through the open front. When Class III cabinets are required, all procedures involving infectious agents (usually

The majority of biological safety cabinets purchased at Ankara University are the

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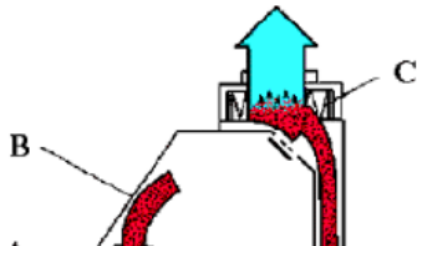

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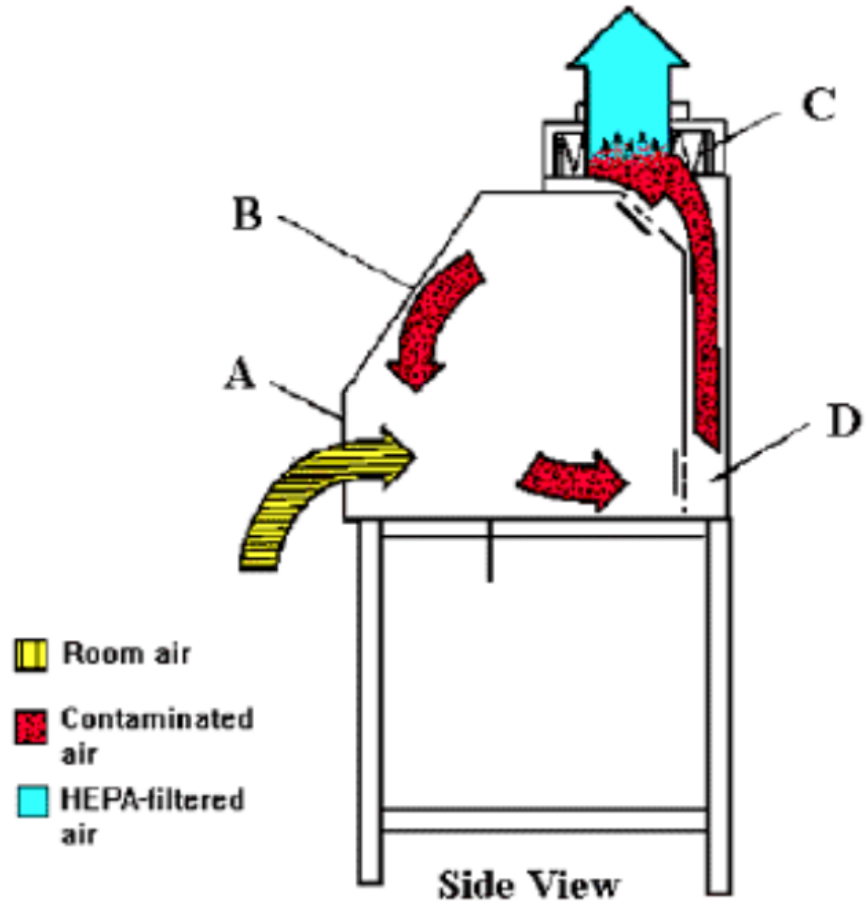

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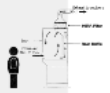

Class II :

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While HEPA filters are effective for trapping particulates and infectious agents, these filters will not capture volatile chemicals or gases.

Class III :

The Class III cabinet is a totally enclosed ventilated cabinet of gas-tight construction. Operations within the Class III cabinet are conducted through attached rubber gloves.
When in use, the Class III cabinet is maintained through negative air pressure of at least 0.5 inches water gauge. Supply air is drawn into the cabinet through HEPA filters. The cabinet exhaust air is filtered by two HEPA filters, installed in series, before discharge outside of the facility.
The exhaust fan for the Class III cabinet is generally separate from the exhaust fans of the facility's ventilation system

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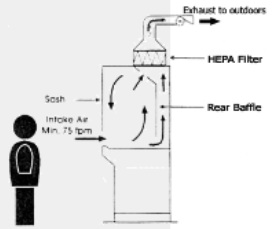

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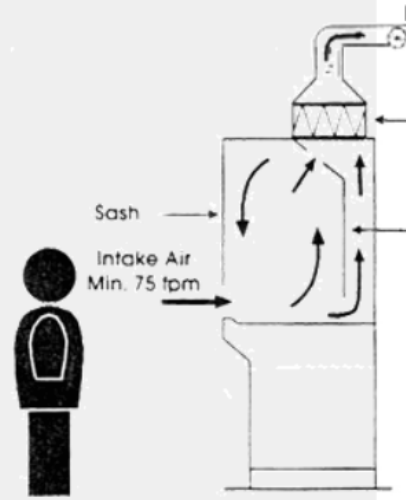

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Biosafety level 3

Personnel protection provided by Class I and Class II cabinets is dependent on the inward airflow. Since the face velocities are similar, they generally provide an equivalent level of personnel protection. The use of these cabinets alone, however, is not appropriate for containment of highest-risk infectious agents because aerosols may accidentally escape through the open front. When Class III cabinets are required, all procedures involving infectious agents (usually Classes 3, 4 or 5) are performed within them.

The majority of biological safety cabinets purchased at Ankara University are the Class II cabinet. The Class II cabinet is the most versatile and economical one available on the market. It is suitable for the containment of biohazardous materials and unlike the Class I biosafety cabinet, it is also suitable as a sterile environment for cell cultures

Some laboratories have purchased laminar flow clean benches for work which may have to be performed in a Class II biosafety cabinet. A laminar flow clean bench will not provide personnel protection since the air is not HEPA-filtered prior to exhaust across the work area. A laminar flow clean bench **MUST NOT BE USED** for any work with Class 2 or 3 agents.

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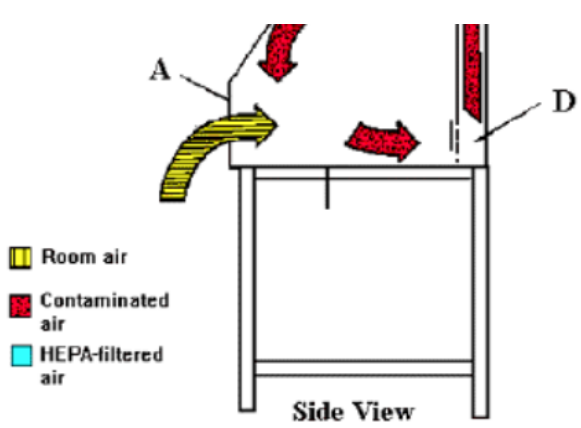

Biosafety cabinets are used to provide primary containment in the laboratory when the investigator is using potentially infectious materials

Biosafety is related to several fields :

THERE ARE FOUR TYPES OF CLASS II CABINETS :

Class II, type A:

This does not have to be vented, which makes it suitable for use in laboratory rooms which cannot be ducted.
This cabinet is acceptable for use of low to moderate risk agents in the absence of volatile toxic chemicals and volatile radionuclides.

This cabinet must be vented, with 30% of the air exhausted from the cabinet while 70% is recirculated back into the room.
This cabinet may be used with etiologic agents treated with minute quantities of toxic chemicals and trace amounts of radionuclides required as an adjunct to microbiological studies if work is done in the directly exhausted portion of the cabinet, or if the chemicals or radionuclides will not interfere with the work when recirculated in the downflow air.

Class II, type B1 :

Class II, type B2 :

This cabinet must be totally exhausted, with 100% of the air exhausted through a dedicated duct. This cabinet may be used with etiologic agents treated with toxic chemicals and radionuclides required as an adjunct to microbiological studies

This must be vented. 70% of the air is exhausted from the cabinet while 30% is recirculated. This cabinet may be used with etiologic agents treated with minute quantities of toxic chemicals and trace quantities of radionuclides that will not interfere with work if recirculated in the downflow air.

Class II, type B3 :

Class II, type A:

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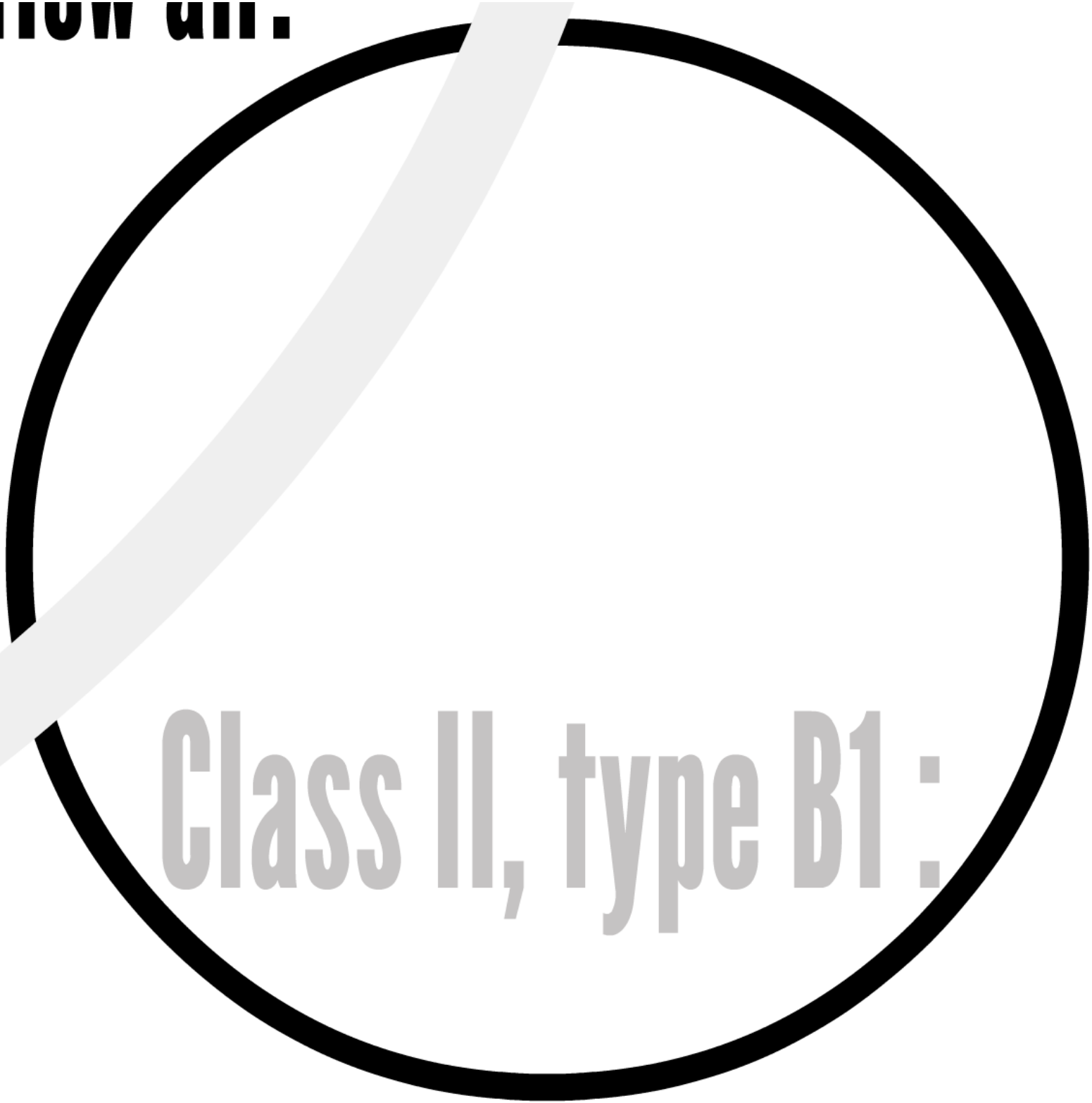
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Class II, type B3 :

Biological Safety

Assoc. Prof. Dr. Ilker BUYUK Wednesday, March 13, 2019

What Is Biological Safety?

Bio Safety

A Biological Safety is :

The prevention of large-scale loss of biological integrity, focusing both on ecology and human health.

These prevention mechanisms include conduction of regular reviews of the biosafety in laboratory settings, as well as strict guidelines to follow.

Biosafety is used to protect us from harmful incidents.

Biosafety is related to several fields :

Ecology
Synthetic Biology
Medicine
Chemistry
Agriculture

Biosafety Level :

High Risk Microbes
BSL-4
BSL-3
BSL-2
BSL-1
Low Risk Microbes

A biosafety level is a level of the biocontainment precautions required to isolate dangerous biological agents in an enclosed laboratory facility. The levels of containment range from the lowest biosafety level 1 (BSL-1) to the highest at level 4 (BSL-4).

- Any Question ?
Thank You ..

Biosafety level 4

4

Biosafety level 3

3

Biosafety level 2

2

Biosafety level 1

1

Biological Safety

Assoc. Prof. Dr. Ilker BUYUK Monday, November, 2015

There Are 3 Types Of Biological Safety Cabinets :

Class I :
Class II :
Class III :

Biosafety level 3

Reference :

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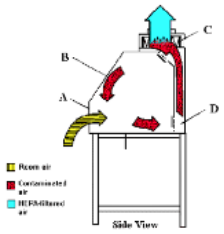

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BSL-1

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Biosafety level 1

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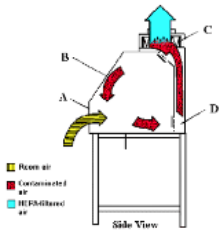

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