

# JI: Technical Definitions

Adapted from Nathaniel T. Murray

# First, some background...

**Definition:** brief explanation

Helps clarify a new  
development or technology

Helps specialists communicate with  
less-knowledgeable readers

**Description:** longer explanation with concepts and/or processes included

**Instructions:** process description intended to enable a person to carry out a task

# You will be writing...

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# Basic Technical Definitions

Elements	Term being defined
	Category to which that term belongs (i.e., a type of...)
	Mutually exclusive features distinguishing it from others in the category

Examples	Eosin is a chemical compound used in making red printing ink.
	The ScanPen 150 is a hand-held scanning device capable of scanning bar and QR codes, as well as text.
	A soldering iron is an electrical device that applies heat to melt solder and make sound electrical and mechanical connections.

# The goal is to help your reader understand

Use simplified language & easily recognizable terms

Use present tense

Use one of the following techniques:

- Visuals: most common (and required for your upcoming assignment!)
- Examples: useful at making an abstract term easy to understand
- Partitions: dividing a thing or idea into a smaller part
- Operations: describing the way something works
- Com/Con: explaining similarities and differences
- Analogy: specialized comparison (two unlike things/alike in some way)
- Negation: a contrast that clarifies a potential point of confusion
- Etymology: the derivation of a word

# Technical Definitions: Examples

TERM	CLASS	DISTINCTIONS
Zoonosis	is an infectious disease	that can be transferred between species.
A cycle	is a complete process or series of processes	that ends in the same state or condition as it began.
Hydrogen embrittlement	is the process	by which metals become brittle and prone to fracture through hydrogen infiltration.
An impeller	is a rotating component within a tube, conduit, or housing	whose purpose is to increase or decrease the flow and pressure of a fluid.
Conservation of energy	is the principle	that energy can neither be destroyed nor created.

# Technical Definitions: Writing Guidelines



## Use a narrow, field-specific category and do not repeat the term in the definition

An electrical insulator is a **material** used for **insulating** electrons.

An electrical insulator is a **non-conductive material** used to **inhibit the flow of** electrons.

## Use qualifying phrases, in case the term is understood differently in other fields

Mechanical efficiency is the ratio of...  
A function is...

**In this report,** mechanical efficiency is the ratio of...  
**In computer programming,** a function is...

## Use audience-appropriate language, the less technical the better to avoid alienating non-expert readers

Wind power density (WPD) is a calculation of the **mean annual power** available per square meter of swept area.

Wind power density (WPD) is a measure of **how much wind energy is available** per square meter of the area that a wind turbine's vanes sweep while turning.

## Use language that does not conflict with other technical terms in your field

An array is a **string** of values...

An array is a **series** of values...

Multiple-layer perceptron (MLP) is an example of an ANN (**artificial neural network**) model comprising multiple layers of neurons between the input and output layers.

## These are the way you can approach writing your definition:

Process
Component parts
Function/purpose
Physical appearance
History

It is widely used to predict, classify, recognize, and learn complicated patterns even in non-linear datasets (Rafiq et al., 2001). Hence, such ANN models can be employed to solve miscellaneous problems in chemical engineering. For instance, modeling of crucial unit operations such as adsorption (Kharitonova et al., 2019), adsorption (Kakkar et al., 2021), distillation (Shin et al., 2020), crystallization (Velásco-Mejía et al., 2016), and filtration (Bagheri et al., 2019) can be implemented to predictive analysis.



# Writing descriptions: consider which one you'll choose

**Objects:** physical site (natural) or synthetic (human-made) artifact

**Mechanisms:** a synthetic object consisting of a number of identifiable parts that work together

**Processes:** an activity that takes place over time (note: 1 situation/purpose wants to understand the process, another may wish to perform it—understand the difference)

# Examples

Model your assignment based on one of the following examples

# Extended Technical Definition: Process Focus

## Fuzzy optimization problem

To formulate a fuzzy optimization problem, decision variables are determined as the specific parameters that are utilized for the configuration of the [fuzzy membership functions](#) for inputs and outputs alongside the fuzzy rule base. Regarding the fact that triangles-shaped membership functions are utilized for the configuration of fuzzy inputs and outputs,  $a_1, a_2, \dots, a_{11}$  in [Fig. 10a](#) denote the variables of the fuzzy inputs and  $b_1, b_2, \dots, b_{11}$  represent the optimization variables of the fuzzy outputs in [Fig. 10b](#). The fuzzy rule base utilizes 64 rules through 64 design variables ( $c_1, c_2, \dots, c_{11}$ ) which can be found in [Table 3](#) (See [Table 4](#)).

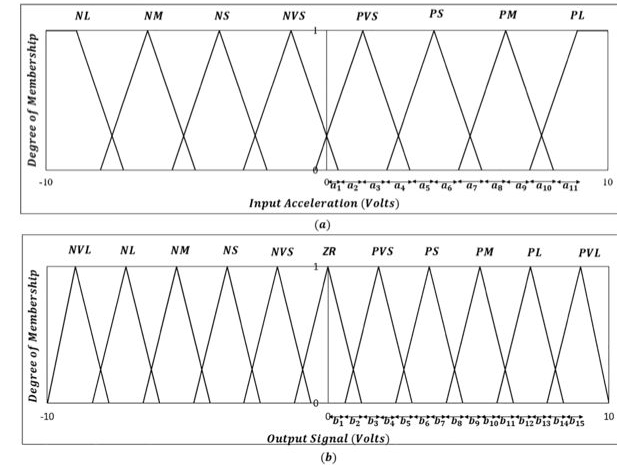


Fig. 10. The optimization variables of membership functions for the (a) fuzzy inputs and (b) fuzzy outputs.

# Extended Technical Definition: Components Focus

## High-speed railway track bridge system (HSRTBS)

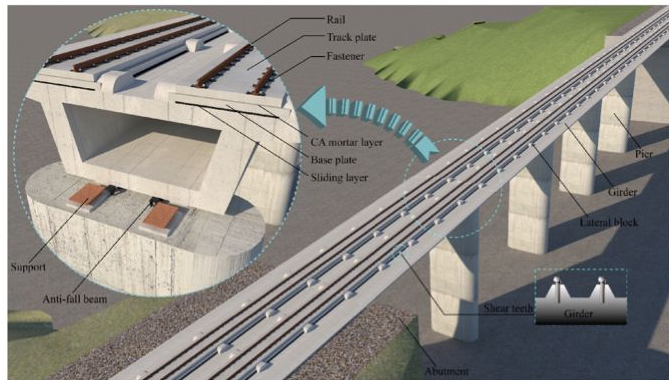


Fig. 1. High-speed railway track bridge system.

A 5-span high-speed railway simply supported bridge with II type ballastless track (CRTSII) is used as the research object. The bridge consists of the major components, namely rail, track plate, [base plate](#), [box girder](#), sliding and fixed supports, piers and [abutments](#), as shown in [Fig. 1](#). The minor components, such as [fasteners](#), CA mortar layer and sliding layer, are set as connecting and [restraining elements](#) between rail and track plate, track plate and base plate, base plate and [girder](#), respectively. Shear bars run through the track plate, CA mortar layer and base plate to provide horizontal restraint for [shear deformation](#) between the track plate and base plate. Shear teeth prevent the relative displacement between the sliding layer and the girder. Lateral blocks are considered on both sides of the base and track plates to prevent them from moving in the transverse direction of the bridge. The anti-fall beam device is arranged near the sliding support to limit the transverse displacement of the girder.

# Extended Technical Definition: Function Focus

## Low dimensional descriptor

Low dimensional descriptor is proposed for detecting anomalies in crowded scenes. The three different features extracted from the optical flow vector of video frames is used to develop a descriptor [\[14\]](#). The three features are listed below.

(a) Feature 1: It is used to eliminate perturbations of the background area in video frames. Feature 1 described here is sum of the threshold of optical flow magnitude of a video frame.

$$\overline{OF}(i, j, k) = \begin{cases} OF(i, j, k), & \text{if } OF(i, j, k) > T \\ 0, & \text{if } OF(i, j, k) \leq T \end{cases} \quad (5)$$

where  $OF$  represents optical flow between objects. The motion of object in which  $OF$  value less than threshold ( $T$ ) is neglected for further calculations.

(b) Feature 2: The Joint Entropy method is applied to find the dissimilarities between two consecutive video frames.

(c) Feature 3: This feature is used for computing variance in space and time. If a video frame has high variance the degree of crowd desperation is very high. Third feature is computed as

$$F3 = \frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2 \quad (6)$$

# Extended Technical Definition: Appearance Focus

## Nanoparticle

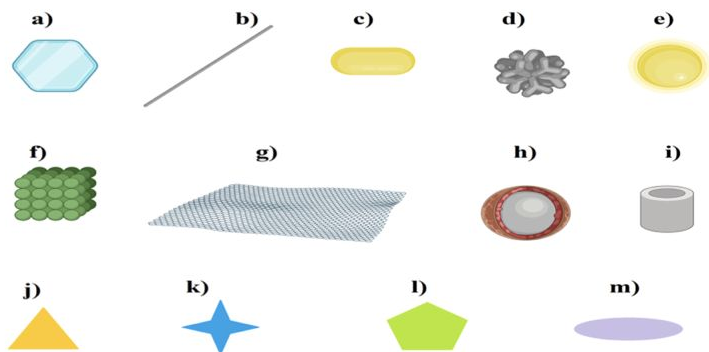


Fig. 2. Various morphologies of common nanomaterials that can potentially be used as antiviral agents: a) hexagonal, b) nanowire, c) nanorod, d) branched nanoparticle, f) cubic, g) nanoplate, h) core-shell, i) nanotube, j) triangular, k) star-shaped, l) pentagonal, and m) spindle-shaped.

The mean diameters of metal-based nanoparticles may vary from a few nanometers to a few hundred nanometers. Antiviral nanoparticles are often spherical, but other shapes are also possible, including cuboids, fibers, and irregular shapes. The internal and surface compositions of nanoparticles can be controlled by fabricating them from different components, which can alter their electrical characteristics and chemical reactivity. Alternatively, the surfaces of nanoparticles can be modified by physically depositing or chemically adding other substances to them after they are prepared. For example, surface modification of metal Pt NPs with the antiviral drugs chloroquine (CQ) and hydroxychloroquine (HCQ) showed the higher adsorption energies than other metal NPs like Ag, Pt, Au, and Ag-Au NPs. In addition to the type of metal NPs and their composition, reduction of the particle size from 2.6 to 1.6 nm and 4.6 to 2.6 nm displayed enhanced the affinity of NPs toward CQ/HCQ [24].



# Extended Technical Definition: History Focus

## Main Belt Comet

The traditional boundary between inactive [asteroids](#) and active comets has recently been blurred by the discovery of a number of puzzling minor bodies that were named so-called Main Belt Comets (MBCs). The first Main Belt Comet, 133P/Elst-Pizarro, was discovered in 1996 ([Elst et al., 1996](#)). Its strange appearance, with an apparently comet-like tail but an asteroidal orbit, was a unique curiosity that attracted worldwide attention ([Boehnhardt et al., 1998](#)). MBCs were first identified as a population following the discovery of two other similar objects in the outer Main Belt ([Hsieh and Jewitt, 2006](#)). The discovery meant that a new, and entirely unexpected, population of comets had been identified, which has important implications for the [Solar System's formation](#) and its evolution. They therefore represent a natural destination for the next comet mission. ... The unique main belt object 311P/(2013 P5) Panstarrs was first discovered by the Pan-STARRS survey telescope in August 2013 and it was detected that the asteroid had six comet-like tails.