

# Elmhurst College

## PHYSICS 301 - Atomic Physics

### SUMMARY OF HARMONIC WAVE PARAMETERS

SPACE PROPERTY	RELATION	TIME PROPERTY
Wavelength ( $\lambda$ )	$v = \lambda/T$	Period (T)
Spatial Frequency (F) or Spectroscopic Wavenumber F / $1/\lambda$	$v = \lambda/F = \lambda \cdot F$	Frequency ( $f$ or $\nu$ ) $f = 1/T$
Propagation Constant (k) or (Angular) Wavenumber k / $2\pi/\lambda$ / $2\pi/\lambda$	$v = \omega/k$	Angular Frequency ( $\omega$ ) $\omega = 2\pi f$ / $2\pi/T$

Here “ $v$ ” is the phase velocity of the wave.

Some examples of harmonic waveforms are:

$$U = U_0 \cos(kx - \omega t) = U_0 \cos \left[ 2\pi \left( \frac{x}{\lambda} - \frac{t}{T} \right) \right] = U_0 \cos[2\pi(Fx - \nu t)].$$