Inductive and capacitive reactance in the AC circuit:

Inductive reactance	Capacitive reactance
The EMF caused by self-induction is always acting **countrary** to the change of current (Lenz's law). The inductor is acting as a voltage source working against the change of **current** in the circuit. As a result the additional resistance appears in the AC circuit containing the inductor. Because it is a reaction of the inductor to the change of the current flowing through the inductor, it is called **inductive reactance**.	In the charging process the capacitor is acting **countrary** to the voltage source used by the charging. The capacitor is acting as a source working against to the charging source. As a result the additional resistance appears in the AC circuit containing the capacitor. Because it is a reaction of the capacitor to the change of voltage across the capacitor, it is called **capacitive reactance**.
The voltage acting from outside to the inductor is the **cause** of the increase of the current flowing through the inductor. The current is determining the energy of magnetic field: $E_m = \frac{1}{2}LI^2$. The current lags behind the voltage applied. The quantity determining the energy lags always behind in the causal relationship. It is so because the transport of energy always needs some time.	The current which is charging the capacitor is the **cause** of the increase of the voltage on the capacitor. Of course, this current itself is caused by the voltage source acting from outside. The voltage is determining the energy of electric field: $E_e = \frac{1}{2}CU^2$. The voltage lags behind the charging current used. The quantity determining the energy lags always behind in the causal relationship.
The increase of the current flowing through the inductor is possible only until the voltage possessing the same polarity in existing. The current begins to decrease when the polarity of the voltage changes. So the current is maximal exactly at the same moment when the decreasing voltage is passing its zero value. It happens a quarter of period after the moment when the maximal value of voltage was reached. For a sine wave voltage to appear across an ideal inductor (possessing $R = 0$), the current through it must be a sine wave that lags behind the voltage by a quarter of period (T/4) in time or by $\pi/2$ radians in phase.	The increase of the voltage is possible only until the current possessing the same polarity in existing. The voltage begins to decrease when the polarity of the current changes. So the voltage is maximal exactly at the same moment when the decreasing current is passing its zero value. It happens a quarter of period after the moment when the maximal value of current was reached. For a sine wave voltage to appear across an ideal capacitor (possessing $R = \infty$), the current through it must be a sine wave that is reaching its maximal value before the voltage by a quarter of period (T/4) in time or by $\pi/2$ radians in phase (the voltage is lagging behind the current).
If we apply to the ideal inductor the alternating voltage $u = U_m \sin \omega t$, then the only one factor limiting the increase of the current in the circuit is the EMF of the self induction: $$\varepsilon_{self} = -L\frac{\mathrm{d}i}{\mathrm{d}t}.$$ So we get $U_m \sin\omega t = L\frac{\mathrm{d}i}{\mathrm{d}t}$ and $\mathrm{d}i = (U_m/L)\sin\omega t\,\mathrm{d}t = (U_m/\omega L)\sin\omega t\,\mathrm{d}(\omega t)$ Integrating $\mathrm{d}i$ over time provides us the net value of instantaneous current: $i(t) = \int\frac{U_m}{\omega L}\sin\omega t\,\mathrm{d}(\omega t) = \frac{U_m}{\omega L}(-\cos\omega t) = I_m \sin(\omega t - \pi/2)$. In the Ohm's law derived by us we have in the role of the resistance the quantity $\boldsymbol{X_L = \omega L}$ called **inductive reactance**.	If we apply to the ideal capacitor the alternating voltage $u = U_m \sin \omega t$, then according to the definition of the capacitance C we have $q = Cu$ and the instantaneous current can be presented as the time derivative of the instantaneous charge $q(t)$: $i(t) = \frac{\mathrm{d}q}{\mathrm{d}t} = \frac{\mathrm{d}(Cu)}{\mathrm{d}t} = C\frac{\mathrm{d}}{\mathrm{d}t}U_m\sin\omega t = \omega CU_m\cos\omega t = I_m\sin(\omega t + \pi/2)$ In the Ohm's law derived by us $I_m = \omega C U_m = \frac{U_m}{\frac{1}{\omega C}}$ we have in the role of the resistance the quantity $\boldsymbol{X_C = 1/\omega C}$ called **capacitive reactance**.