University of Mosul

College of Petroleum & Mining Engineering

"**Reservoir modelling and simulation**"

Dervative of a 3D-cartesian fluid flow equation

Lecture …(8)….

Dr. Nabhan Abdulkareem Al-Bazzaz

Petroleum and Refining Engineering Department

Email: nabhanabdul@uomosul.edu.iq

LECTURE CONTENTS

- ❑ Review of basic steps.
- ❑ Assumptions made in the derivation of the above PDE:
- ❑ Conservation of mass.
- ❑ Conservation of momentum.
- ❑ Constitutive equation for porous materials.
- ❑ Constitutive equation for fluids.

Generally speaking, flow equations for flow in porous materials are based on a set of mass, momentum and energy conservation equations, and constitutive equations for the fluids and the porous material involved.

$$\frac{\partial^2 p}{\partial x^2} + \frac{\partial^2 p}{\partial y^2} + \frac{\partial^2 p}{\partial z^2} = \frac{\emptyset \mu c}{k} \frac{\partial p}{\partial t} \quad \boxed{\text{.......}} \quad (\text{unsteady state (transient)})$$