OREGON STATE UNIVERSITY
School of Chemical Biological and Environmental Engineering

CHE 331
Transport Phenomena I

Dr. Goran Jovanovic

Course Goals

- To apply the principles of material & energy balances, and momentum transfer to analysis and design of simple operations which involve fluid flow.
- To develop the awareness of design criteria, types of equipment, and important process variables that are characteristic for chemical and biological processes.
- To encourage, develop, and animate students' ability for creative thinking in solving engineering problems.
- To develop ability to synthesize and integrate information and ideas.
- To develop openness for new ideas.
- To develop student's ability to work productively with others.
- To advance students' competence in effective presentation of technical subjects using verbal, graphical, and written forms of communication.

TOPICS

1. Methodology for Creating Mathematical Models related to Flow of fluids. Formulation of Initial and Boundary Value Problems;
2. Fluid Static, Fluid Dynamics, and Surface Tension;
3. Macroscopic Balances – Mechanical Energy Balance Equation;
4. Non-Newtonian Fluids, Viscosity of Gasses and liquids;
5. Flow Through Porous Media, Packed beds and Fluidized beds;
6. Derivation of the Continuity and the Momentum Equation using Differential volume analysis. Development of Navier-Stokes Equations;
7. Applications of Navier-Stokes equations in simple geometric structures and flow situations, Elements of Turbulent Flow.

Course Learning Objectives

By the end of this course, students will be able to:

1. Solve simple fluid static problems including application of surface tension.
2. Develop and apply the mechanical energy balance equation for flowing streams, and in the design of flow through granular media.
3. Apply the Shear rate - Shear stress relationship to discriminate among *Non-Newtonian* fluids.
4. Derive differential form of the continuity and the momentum equations for flowing streams; *Navier-Stokes* equation.
5. Apply *Navier-Stokes* equations to find the velocity profile, flow rate, and pressure drop in simple flow situations.
6. Develop mathematical models & solve problems involving various fluid flow situations.

GRADING

Homework	30%
Tests	35%
Final Exam	25%
Studio	10%

$$Total\ Score = \frac{H}{H_{max}} * 0.30 + \frac{T}{T_{max}} * 0.35 + \frac{F}{F_{max}} 0.25 + \frac{S}{S_{max}} * 0.10$$

If you earn bonus points:

$$Tot.\,Score = \frac{H + h_b}{H_{max}} * 0.30 + \frac{T + t_b}{T_{max}} * 0.35 + \frac{F + f_b}{F_{max}} 0.25 + \frac{S + s_b}{S_{max}} * 0.10$$

Thus *Total Score* is a number: ***0 < Total Score < 1+***

GRADING (cont.)

	Total Score ≥ 0.950	➔ Grade A
0.950 >	*Total Score* ≥ 0.900	➔ Grade A-
0.900 >	*Total Score* ≥ 0.866	➔ Grade B+
0.866 >	*Total Score* ≥ 0.833	➔ Grade B
0.833 >	*Total Score* ≥ 0.800	➔ Grade B-
0.800 >	*Total Score* ≥ 0.766	➔ Grade C+
0.766 >	*Total Score* ≥ 0.733	➔ Grade C
0.733 >	*Total Score* ≥ 0.700	➔ Grade C-

Please, settle all your HMW-Studio-Exam grades with Graders and TA's as soon as possible.


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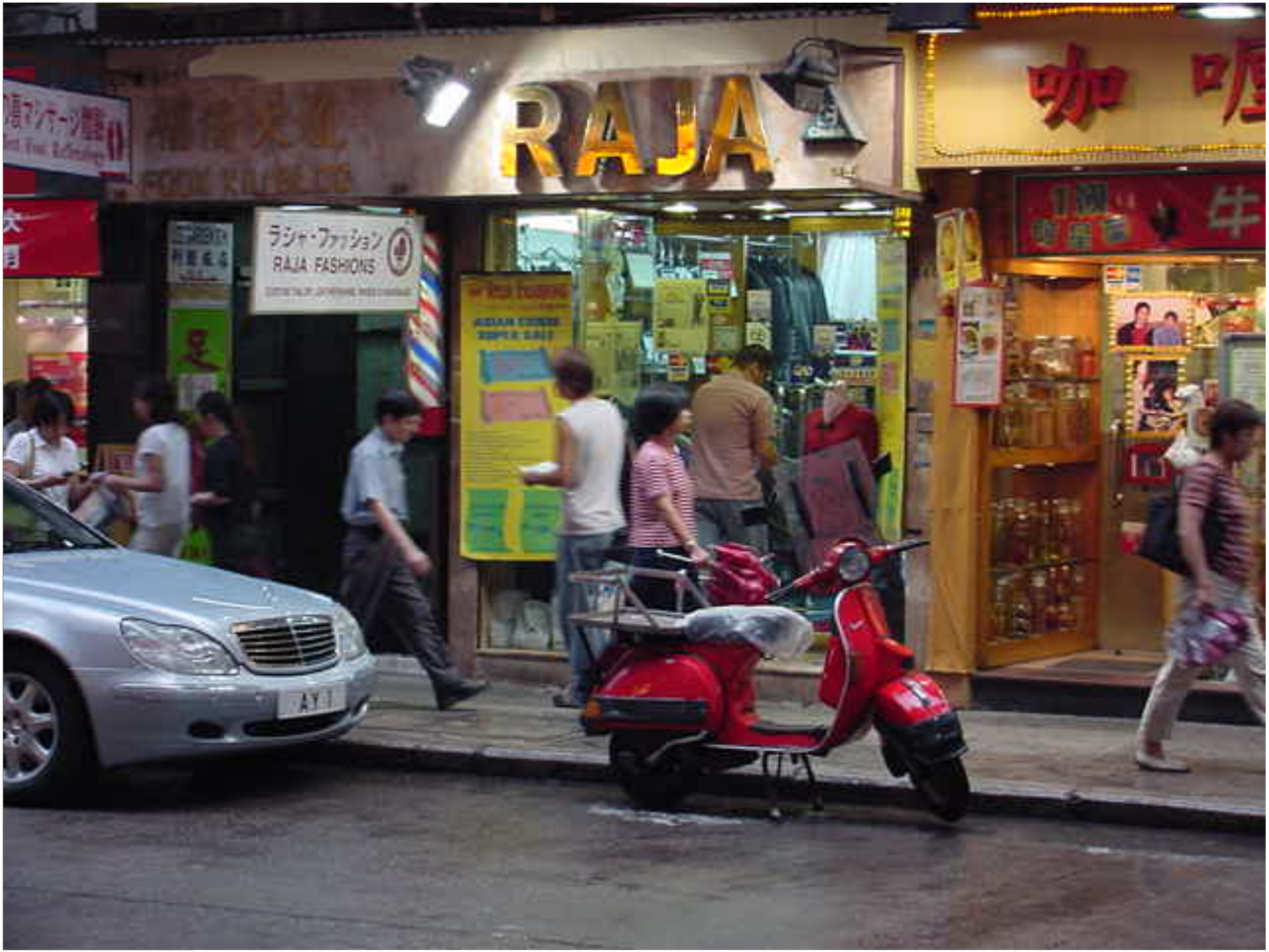
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OSU College of Engineering


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