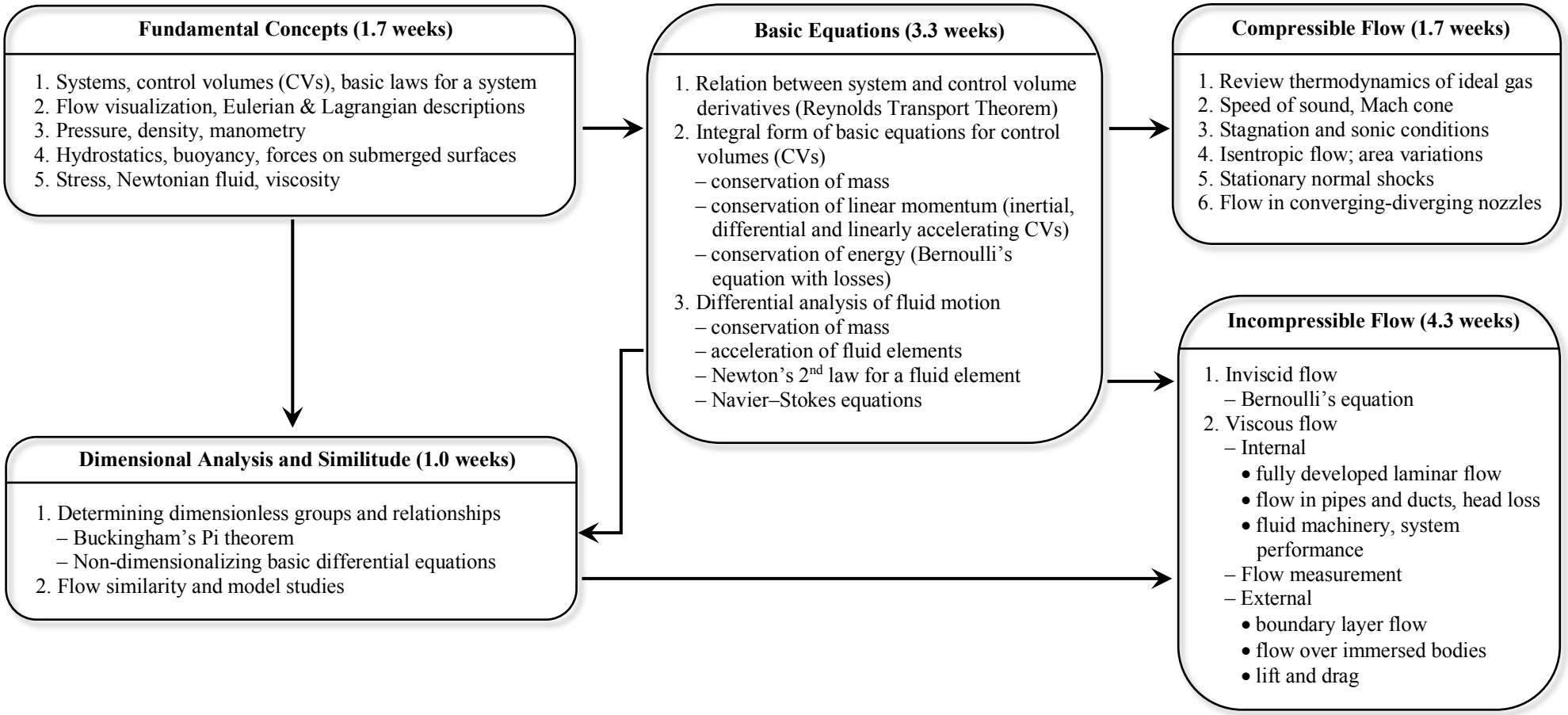
ME 30800
FLUID MECHANICS

Course Outcomes [Related ME Program Outcomes in brackets]

1. Develop the ability to identify and classify the various *types of flows* one may encounter. [1]
2. Develop (from rigorous first principles) the *control volume formulation* of the basic laws with emphasis on conservation of mass and Newton's 2nd law. [1]
3. Apply the control volume formulation of the basic laws to *model physical systems*. [1]



COURSE NUMBER: ME 30800

COURSE TITLE: Fluid Mechanics

REQUIRED COURSE OR ELECTIVE COURSE: Required

TERMS OFFERED: Fall and Spring

RECOMMENDED TEXTBOOKS:

P.J. Pritchard and J.W. Mitchell, *Fox and McDonald's Introduction to Fluid Mechanics*, 9th ed., John Wiley & Sons.

P.M. Gerhart, A.L. Gerhart and J.I. Hochstein, Munson, *Young and Okiishi's Fundamentals of Fluid Mechanics*, 8th ed., John Wiley & Sons.

F.M. White, *Fluid Mechanics*, 8th ed., McGraw-Hill.

PRE-REQUISITIES:

ME 20000 – Thermodynamics I
ME 26300 – Introduction to Mechanical Engineering Design, Innovation, and Entrepreneurship
ME 27400 – Basic Mechanics II
MA 26200 – Linear Algebra and Differential Equations

COORDINATING FACULTY: C. Wassgren & P. Vlachos

COURSE DESCRIPTION: Continuum description, velocity field, fluid statics, manometers, basic conservation laws for systems and control volumes, dimensional analysis. Bernoulli's equation along a streamline and with head losses. Flow over submerged bodies, boundary layers. Viscous flows in pipes, turbomachinery, system performance. One-dimensional gas dynamics.

COURSE OUTCOMES [Related ME Program Outcomes in brackets]:

1. Develop the ability to identify and classify the various *types of flows* one may encounter. [1]
2. Develop (from rigorous first principles) the *control volume formulation* of the basic laws with emphasis on conservation of mass and Newton's 2nd law. [1]
3. Apply the control volume formulation of the basic laws to *model physical systems*. [1]

ASSESSMENTS TOOLS:

1. Weekly homework.
2. Exams.
3. Lecture quizzes.

NATURE OF DESIGN CONTENT: None

RELATED ME PROGRAM OUTCOMES:

1. Engineering fundamentals

PROFESSIONAL COMPONENT:

1. Engineering Topics: Engineering Science – 100%
   Engineering Design – 0%

COMPUTER USAGE: Knowledge of word processing, spreadsheet software, and basic programming (for example, MATLAB) are necessary for homework assignments.

COURSE STRUCTURE/SCHEDULE:

Lectures – 3 days per week at 50 minutes

PREPARED BY: J. Chen (Updated by I. Christov)

REVISION DATE: January 28, 2020