TO: The Engineering Faculty

FROM: The Faculty of the School of Mechanical Engineering

RE: Course Modification - ME 30800 Fluid Mechanics

The Faculty of the School of Mechanical Engineering has approved the following modification to an existing course. The format of ME 30900 will be altered from a total of 4 credits, including 3 credits of lecture and 1 credit of laboratory, to 3 credits of lecture only, with the 1 credit of laboratory assigned to a new dedicated laboratory course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

FROM:

ME 30900 Fluid Mechanics, Sem. 1, 2, Lecture 1, Lab prep 1, Lab 1, cr. 4. Prerequisites: ME 20000, ME 26300, ME 27400, MA 26200, or MA 26500 and MA 26600, or MA 35000 and MA 36000 or equivalents.

Continuum, velocity field, fluid statics, manometers, basic conservation laws for systems and control volumes, dimensional analysis. Euler and Bernoulli equations, viscous flows, boundary layers, flow in channels and around submerged bodies, one-dimensional gas dynamics, turbomachinery.

TO:

ME 30800 Fluid Mechanics, Sem. 1, 2, Lecture 3, cr. 3. Prerequisites: ME 20000, ME 27400, MA 26200, or MA 26500 and MA 26600, or MA 35000 and MA 36000 or equivalents. Concurrent Prerequisites: ME 26300

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.

Reason: The lab component of the course has been split into a separate 1 cr course ME 30801 Fluid Mechanics Laboratory to allow for better enrollment load balancing in the existing ME undergraduate laboratory facilities. The material covered in ME 30900 (3 cr) Fluid Mechanics lecture course does not change, and the material covered in ME 30801 (1 cr) Fluid Mechanical Laboratory remains the same as the current laboratory component of the current/existing ME 30900 (4 cr) Fluid Mechanics lecture and laboratory course. An updated description of the modified ME 30900 (3 cr) Fluid Mechanics lecture course is outlined in the appended material below.

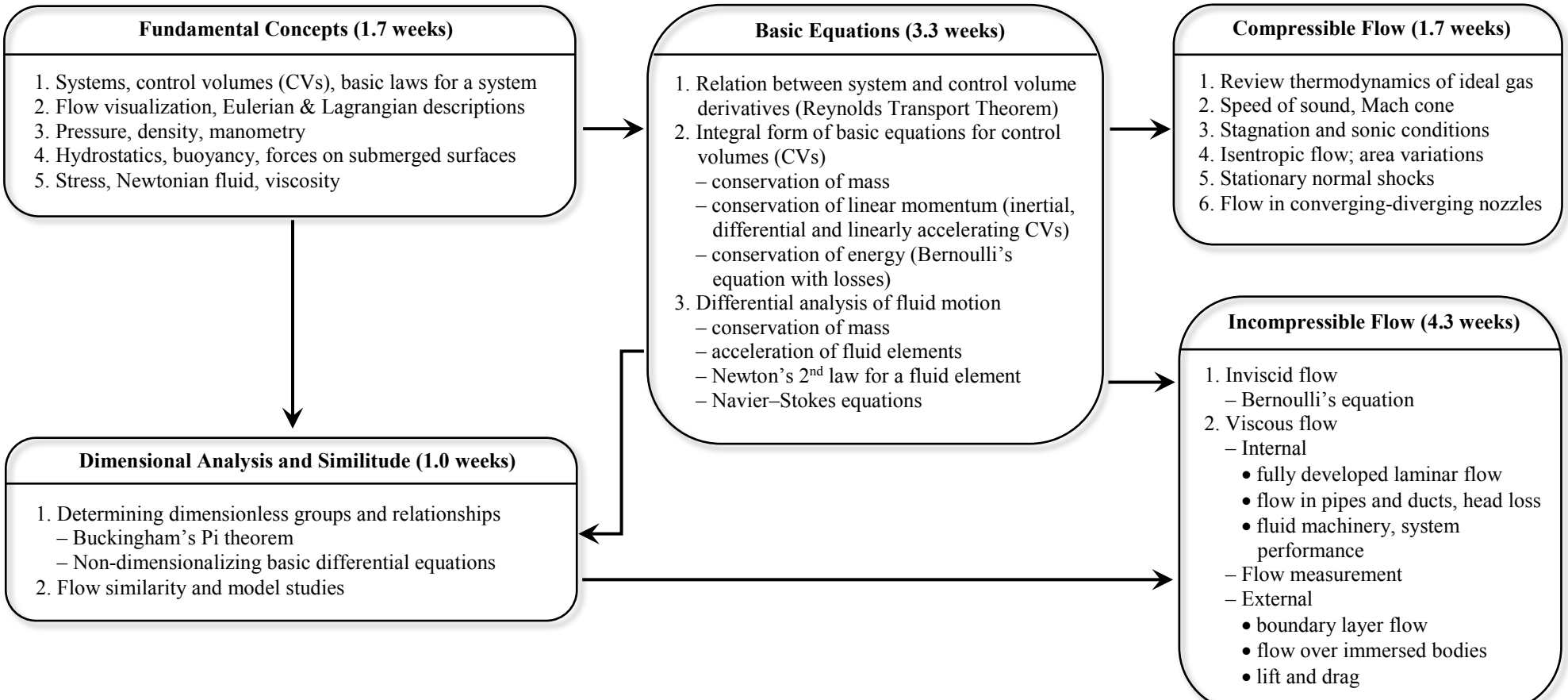
James D. Jones

James D. Jones, Associate Professor and Associate Head
School of Mechanical Engineering

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.

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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