TO: The Faculty of the College of Engineering

FROM: The Faculty of the School of Mechanical Engineering

RE: ME 42800 Dynamical Systems – Permanent course number

The Undergraduate Curriculum Committee of the School of Mechanical Engineering has approved a permanent course number (ME 42800) for the course "Dynamical Systems." The action is now submitted to the Engineering Faculty with a recommendation for approval.

ME 42800 Dynamical Systems (cr: 1).
Prerequisites: MA 303 and ME 365

This course introduces the modeling and analysis of dynamical systems providing the tools for problem-solving of complex mechanical, electromechanical, and aerospace systems. The course focuses on providing a unified approach to derive equations of motion of diverse linear systems the solution of which can be obtained in generic fashion. The course is designed to draw from differential equations, dynamics, and control systems courses, thereby unifying seemingly diverse concepts and tools under the dynamical systems umbrella.

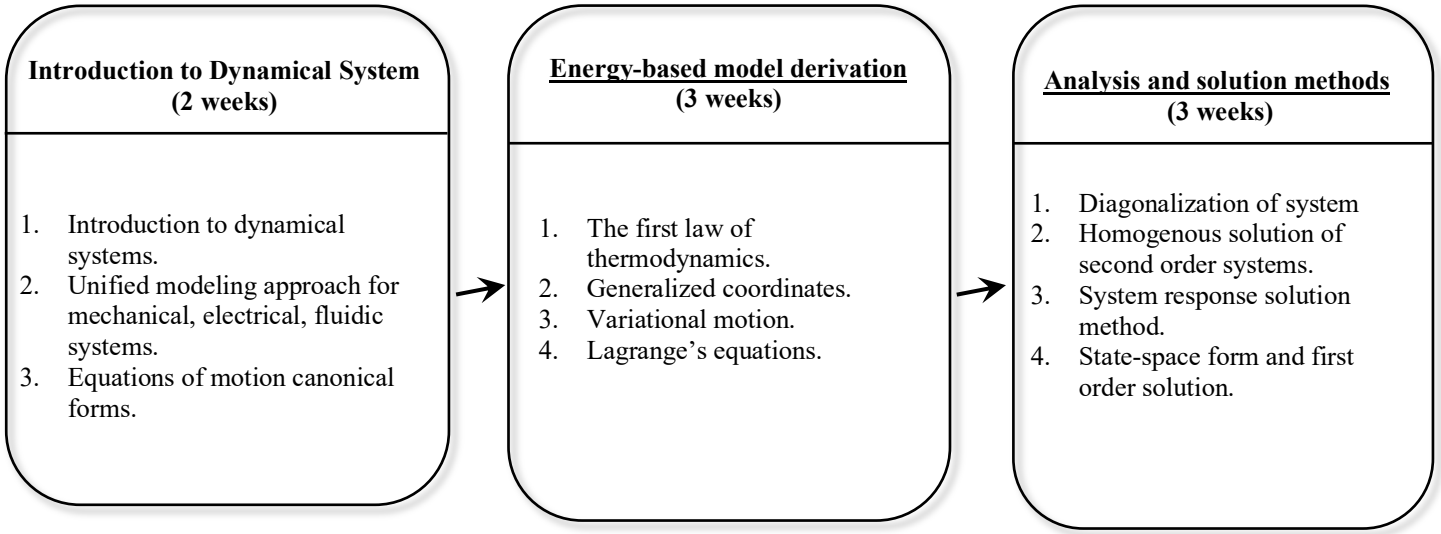
Reason: This course is required for the Concentration in Dynamical Systems Modeling & Analysis for BSME, which was recently approved by the Engineering Curriculum Committee (EFD 43-25). In the concentration, the course is currently listed with a temporary number (ME 49601). The registrar's office asked us to obtain a permanent number before they can approve the concentration in Curriculog.

Jitesh Panchal
Associate Head for Undergraduate Studies
Professor of Mechanical Engineering

ME 49601: Dynamical Systems

Course Outcomes [1, 2, 3, 5, 7]

1. Familiarization with energy-based methods for equations of motion derivation.
2. Derivation and analysis of linear dynamical systems via canonical forms of equations of motion.
3. Familiarization with general solution approaches to linear dynamical systems.



COURSE NUMBER: ME 49601 **COURSE TITLE:** Dynamical Systems

REQUIRED COURSE OR ELECTIVE COURSE: Elective, 1 credit hour course

TERMS OFFERED: Spring semester

TEXTBOOK/REQUIRED MATERIAL:

Analytical System Dynamics, Brian Fabien, 2009

PRE-REQUISITIES: MA 303 and ME 365

ATTRIBUTES: 1. Junior and Senior undergraduate students

COORDINATING FACULTY: Andres F. Arrieta

COURSE DESCRIPTION: This course introduces the modeling and analysis of dynamical systems providing the tools for problem-solving of complex mechanical, electromechanical, and aerospace systems. The course focuses on providing a unified approach to derive equations of motion of diverse linear systems the solution of which can be obtained in generic fashion. The course is designed to draw from differential equations, dynamics, and control systems courses, thereby unifying seemingly diverse concepts and tools under the dynamical systems umbrella.

COURSE OUTCOMES [1,3,5,7]:

1. Familiarization with energy-based methods for equations of motion derivation.
2. Derivation and analysis of linear dynamical systems via canonical forms of equations of motion.
3. Familiarization with general solution approaches to linear dynamical systems.

ASSESSMENTS TOOLS:

1. Homework
2. Project report* & presentation
3. Exams

* Projects will be focused on model derivation, solution, and analysis of different types of dynamical system.

RELATED ME PROGRAM OUTCOMES:

1. Ability to formulate and solve complex engineering problems applying basic principles from dynamical systems.
2. An ability to apply engineering analysis tools to design solutions addressing industrial and societal needs.
3. Ability to communicate to a diverse audience including ME students.
4. Ability to function effectively on teams to collaborate and create solutions that meet established goals, tasks and objectives.
5. Ability to develop and conduct appropriate experimentation, analysis and interpretation of data, and use of engineering judgement to draw conclusions, establish goals, plan tasks, and meet objectives.
6. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

COMPUTER USAGE: Homework and project assignments will require the use of software packages to obtain problem solutions. Computer modeling will facilitate analysis of results.

COURSE STRUCTURE/SCHEDULE:

a. Classroom instruction – 2 days per week at 50 min each for 8 weeks

PREPARED BY: Andres F. Arrieta, James Gibert, Chuck Krousgrill **REVISION DATE:** September 15, 2024