### MEC 393  Engineering Fluid Mechanics

**Credits:** 3  
**Contact Hours:** 3 hour lectures per week

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<thead>
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<th>LEAD COORDINATOR</th>
<th>TEXTBOOK</th>
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| J. Kincaid       | Aerodynamics for Engineers by J.J. Bertin, Prentice Hall  
Intro to Fluid Mechanics by W.S. Janna, PWS Publishing Co. |

**SUPPLEMENTAL MATERIAL**

**BULLETIN DESCRIPTION**

The application of the principles of fluid mechanics to important areas of engineering practice such as turbomachinery, hydraulics, and wave propagation. Prepares students for advanced coursework in fluid dynamics. Extends the study of viscous effects, compressibility, and inertia begun in MEC 364.

**PREREQUISITES:** MEC 364  
**THIS COURSE IS** a Technical Elective

### COURSE LEARNING OBJECTIVES

| 1. Understanding the differential form and numerical solutions to Navier-Stokes Equations | Exams |
| 2. Understanding the concept of Computational Fluid Dynamics (CFD) | Exams |
| 3. Know how to analyze incompressible viscous flow | Exams |
| 4. Understanding the principle of turbomachinery | Exams |
| 5. Understanding the principle of airfoil and wing aerodynamics and design | Exams |
| 6. Understanding the dynamics of a compressible flow field | Exams |

### STUDENT OUTCOMES SUPPORTED

(Scale 1-3)

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3 – Strongly supported  
2 – Supported  
1 – Minimally supported  
Program Criteria

### COURSE TOPICS

1. The differential forms and numerical solutions to the Navier-Stokes Equations.  
2. Computational fluid dynamics (CFD)  
3. Analysis of Incompressible Viscous Flow using the Generalized Bernoulli Equations  
4. External Incompressible Viscous Flow Field  
5. Introduction to Turbomachinery  
6. Incompressible, Inviscid, Flow Field  
7. Airfoil and Wing Aerodynamics and Design  
8. Incompressible Flows around Airflows of Infinite and Finite Span  
9. Dynamics of a Compressible Flow Field  
10. Introduction to Flight at Transonic, Supersonic, and Hypersonic Speed Regimes, if time permits