# Course Outline (Higher Education)

**School:** School of Engineering, Information Technology and Physical Sciences

**Course Title:** THERMOFLUIDS

**Course ID:** ENGIN2304

**Credit Points:** 15.00

**Prerequisite(s):** (ENGIN1005)

**Co-requisite(s):** Nil

**Exclusion(s):** (ENCOR2100)

**ASCED:** 030701

**Description of the Course:**

This course is an introduction to fluid mechanics, knowledge of which is readily applicable in various industries like water distribution, oil & gas, pharmaceuticals, energy conversion (conventional and renewables) and aerodynamics among many others. The course will cover all of the fundamental aspects of fluid mechanics including pressure measurement, hydrostatics, continuity, momentum and energy equations together with an introduction to applications of these basic principles to various fluid mechanics devices like pumps and turbines.

**Grade Scheme:** Graded (HD, D, C, P, MF, F, XF)

**Placement Component:** No

**Supplementary Assessment:** Yes

Where supplementary assessment is available a student must have failed overall in the course but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

**Program Level:**

| Level of course in Program | AQF Level of Program | | | | | |
|---|---|---|---|---|---|---|
| | 5 | 6 | 7 | 8 | 9 | 10 |
| Introductory | | | | | | |
| Intermediate | | | ✔ | | | |
| Advanced | | | | | | |

**Learning Outcomes:**

On successful completion of the course the students are expected to be able to:

**Knowledge:**

**K1.** Understand the origin and derivation of the basic governing equations of mass, momentum and energy and their application to engineered fluid systems.

**K2.** Characterise the different types of fluids and flows.

**K3.** Understand the Lagrangian and Eulerian methods of fluid flow description.

**K4.** Describe the importance of the Reynolds number and its importance in fluid engineering problems.

**K5.** Explain the energy equation and its application to energy conversion devices likes pumps and turbines.

**Skills:**

**S1.** Identify the basic governing equations responsible for fluid behavior in engineered fluid systems.

**S2.** Apply the Lagrangian and Eulerian framework to practical fluid mechanics devices like jets, blades, mixers, pumps and turbines.

**S3.** Calculate the hydrostatic forces present on horizontal and inclined planes.

**S4.** Transpose and solve all of the simple forms of fundamental fluid mechanic equations (energy, continuity and momentum).

**S5.** Use the Moody diagram to interpret friction factors, relative roughness and Reynolds Number.

**S6.** Solve simple problems relating to drag and lift;

**S7.** Solve simple work and energy analysis problems;

**Application of knowledge and skills:**

**A1.** Use the mass and momentum equations to solve practical engineering problems such as pipe flow, flow measurement and the determination of hydrostatic forces on submerged structures;

**A2.** Use the energy equation to solve practical engineering problems relating to energy conversion devices like pumps and turbines.

**Course Content:**

Topics may include:

- Introduction to fluids, fluid statics and fluids in motion.
- Basic conservation equations: Mass, momentum and energy, their integral and differential forms.
- Internal and external flows
- Fluid measurement principles and instruments.
- Energy equation application to pumps and turbines

**Values:**

**V1.** Appreciate that an understanding of fluid dynamics is essential in many disciplines of engineering;

**V2.** Appreciate that learning is a lifelong process

**V3.** Appreciate the importance of safety, environmental and community considerations in dealing with fluid flow structures.

**V4.** Appreciate that fluid mechanics is an important foundation area for subsequent, more advanced, engineering studies.

### Graduate Attributes

The Federation University FedUni graduate attributes (GA) are entrenched in the Higher Education Graduate Attributes Policy (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni course, and all attributes must be directly assessed in each program**

| Graduate attribute and descriptor | | Development and acquisition of GAs in the course | |
|---|---|---|---|
| | | Learning Outcomes (KSA) | Assessment task (AT#) |
| GA 1 Thinkers | Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions. | K1-K5, S1-S7, A1-A2 | 1-3, 5 |
| GA 2 Innovators | Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change. | Not applicable | Not applicable |
| GA 3 Citizens | Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately. | Not applicable | Not applicable |
| GA 4 Communicators | Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand. | S3, S4, S6-S7 | 3-4 |
| GA 5 Leaders | Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices. | Not applicable | 4 |

### Learning Task and Assessment:

| Learning Outcomes Assessed | Learning Tasks | Assessment Type | Weighting |
|---|---|---|---|
| K1-K3, S1-S3, A1 | The class test will examine students understanding of the introductory topics and check their engagement. | Class test | 5% |
| K1-K5, S1-S7, A1-A2 | Multiple choice questions designed to examine student's understanding of the lecture topics in the week. | Weekly Quizzes | 10-20% |
| K1-K5, S1-S6, A1-A2 | Numerical problems to solve to develop critical thinking and problem solving skills. | Numerical assignments | 20-30% |
| S3, S6, S7, A1-A2 | Practical application of the fluid mechanics priniciples and team work assessed by a lab report. | Lab report | 15-20% |
| K1-K5, S1-S7, A1-A2 | Numerical problems and practical industrial scenarios are provided to assess students ability to apply the fluid mechanics principles. | Final exam | 50-60% |

### Adopted Reference Style:

Other (Refer to the library website for more information: IEEE)

Refer to the library website for more information

Fed Cite - referencing tool