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Other teaching staff

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Unit description*

This unit builds on KNE213 Thermal and Fluid Engineering, which introduced basic principles of conservation of mass, momentum and energy. The unit introduces important concepts of forces acting on bodies immersed in fluid flow. The governing equations of fluid flow in integral form are used to analyse a range of practical applications: boundary layers, pipe flow, pump-machine systems, open channel flow, hydraulic jumps, pumps, and turbines. The unit also provides an introduction to differential flow analysis and potential flow theory.

Intended learning outcomes*

The main learning outcome is to understand the equations that govern fluid flow (conservation of mass, momentum and energy) and be able to apply them to a range of practical problems, including:

1. Predicting drag forces on bluff, streamline bodies and flat plates;
2. Analysing the flow in open channels and pipe systems;
3. Analysing performance of radial flow pumps and turbines;
4. Matching pumps and turbines for particular applications; and
5. Constructing basic 2 dimensional inviscid flow fields using potential flow.

This unit will also develop students’ abilities in

6. conducting experimental measurements; and
7. technical report writing.

The unit also aims to develop skills in working effectively with others through the laboratory component of the unit. One or two seminars will be held early in the semester, to discuss expectations regarding laboratory practice and reporting.

Generic graduate attributes^*

The University has defined a set of generic graduate attributes (GGAs) that can be expected of all graduates (see http://www.utas.edu.au/governance-legal/policy/documents/alphabetical-policy/g/genericattributes_grads1.pdf). By undertaking this unit you should make progress in attaining the following attributes:

Knowledge:
- ability to apply knowledge of basic science and engineering fundamentals
- in-depth technical competence in at least one engineering discipline

Communication skills:
- ability to communicate effectively, not only with engineers but also with the community at large

Problem-solving skills:
- ability to undertake problem identification, formulation and solution
- ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a leader or manager as well as an effective team member;

The University has also defined a set of generic graduate attributes which can be expected of all graduates. In brief, these are: Knowledge, Communication Skills, Problem-Solving Skills, Global Perspective, and Social Responsibility. This unit mainly helps to provide the first three of these attributes.
Alterations to the unit as a result of student feedback*
1. Laboratory work is sequenced such that most of the background theory is covered before hand.
2. Prelab exercises were introduced to help prepare students for the laboratory sessions.

Prior knowledge &/or skills
The unit assumes the student has previous knowledge of the following topics:
- one-dimensional frictionless flow theory (Bernoulli equation and continuity equation);
- conservation of linear momentum;
- fluid flow measurement techniques such as Bell-mouth nozzles, venturi nozzles, orifice plates and sharp edge weirs;
- frictional flow in pipes including major and minor losses;
- differential and vector calculus; and
- dimensional analysis.

Prerequisite Units
This unit assumes an understanding of basic fluid mechanics principles and requires successful completion (PP or better) of both KNE213 Thermal and Fluid Engineering (or KNT210) and KME271 Engineering Mathematics (or KNT227). Equivalent standing may be granted for successful completion of an equivalent unit taught at a different tertiary institution.

Learning expectations and teaching strategies/approaches

Expectations
The University is committed to high standards of professional conduct in all activities, and holds its commitment and responsibilities to its students as being of paramount importance. Likewise, it holds expectations about the responsibilities students have as they pursue their studies within the special environment the University offers.

The University’s Code of Conduct for Teaching and Learning states:

Students are expected to participate actively and positively in the teaching/learning environment. They must attend classes when and as required, strive to maintain steady progress within the subject or unit framework, comply with workload expectations, and submit required work on time.

Teaching and learning strategies
Attending lectures is highly recommended. All material covered in lectures will not be made available in electronic form. A summary of relevant content will be provided in the lecture support notes – but this will not be a complete lecture notes.

If you do not understand something in lectures or tutorials, please ask for clarification in the lecture if need be, or immediately after the lecture if your question can wait until then. Asking questions is part of the learning process and it is strongly encouraged.

Participation in tutorials is strongly recommended. Previous experience has shown that students who work through problems usually do well in the final examination. Just looking at how someone else solved a problem does not develop your understanding or problem
solving skills, and will help you little in the exam. You should use tutorial time most efficiently by working on the scheduled tutorial (as opposed to the previous one), and asking your tutor questions.

If you need assistance in preparing for study please refer to your tutor or lecturer. For additional information refer to the Learning Development website:

http://www.utas.edu.au/learndev/

Learning resources required

Requisite texts

Lecture support notes will be available on MyLO and these are intended to supplement theory covered in lectures, together with tutorial questions & answers and other material (e.g. laboratory experiment instructions). MyLO will be used in this unit to support face-to-face teaching activities.

The subject of fluid mechanics can be presented in many ways, and students are strongly encouraged to see what other people have to say about various topics. The recommended text is


This is on reserve in the library and is available for purchase from the University’s Co-operative bookshop. Many other fluid mechanics texts are available in the library. Web resources for fluid mechanics are excellent.

Other useful texts include:


E- (electronic) resources

MyLO will be used to assist face-to-face teaching activities in several areas:

- Electronic copies of lecture support notes, weekly tutorials, worked solutions and lab notes will be provided on MyLO.
- An asynchronous discussion aimed to assist students in exploring common problems and issues.
- Class announcements
- Internal marks using the grade book function

Computer hardware & software

For MyLO

To access MyLO from your own computer you will need the appropriate software, and hardware to run that software. Please see UConnect at http://uconnect.utas.edu.au/ for information about computer software you will need.

Note: Older computers may not have the hardware to run some of the required software applications. Contact your local IT support person or the Service Desk on 1818 if you experience difficulties. See MyLO: Information for Students for further information about accessing MyLO.
Details of teaching arrangements*

**Lectures/Intensive sessions**
Three 1 hour Lectures will be delivered each week, with exception to week 8 where there will be a mid-semester test. Lecture times in week 13 will be used for revision.

**Tutorials**
Tutorials will be run in weeks 2-13. These are used to support lecturing and are designed to give students the opportunity to reflect on material covered in lectures, develop problem solving skills and also provide necessary feedback on their understanding of the unit. Previous experience has shown that students who work through problems usually do well in the final examination. Solutions will be placed on MyLO one week following the due date.

**Mid-Semester Test**
One mid-semester test will be held during semester in week 8. This is designed to give students feedback on their understanding of the unit while working under a time constraints. Students should bring pens/pencils and a non-programmable scientific calculator. Adequate space for answers will be provided in the exam-style answer booklets.

**Laboratory Work**
Laboratories will be held on Wednesday mornings and afternoons, beginning in Week 3. The laboratory teams and the schedule of sessions will be announced soon after the start of the unit. Each team is required to carry out three separate experiments.

The handout Laboratory Method and Reporting sets out expectations for laboratory practice, reporting, and marking. There will be a pre-laboratory assignment that is due at the beginning of each laboratory session (individual, 20% of lab mark). This will not be very difficult and will help you to prepare for the experiment.

During the experiment the group is expected to produce a set of laboratory notes (group, 20% of lab mark) and a final report (group, 60% of lab mark).

Please ensure that all team members contribute to each report. *The material covered in laboratory work is examinable.*

**Occupational health and safety (OH&S)**
The University is committed to providing a safe and secure teaching and learning environment. In addition to specific requirements of this unit you should refer to the University’s policy at: [http://www.admin.utas.edu.au/hr/ohs/pol_proc/ohs.pdf](http://www.admin.utas.edu.au/hr/ohs/pol_proc/ohs.pdf)

As standard practice, you must wear clothes appropriate for laboratory work. You will be asked to leave the laboratory if you turn up wearing thongs, shorts, or a T-shirt !! As per your workshop practices sessions, you must wear proper shoes, jeans or trousers, and long-sleeve shirts to protect against spillage or abrasion, and avoid wearing ties or scarves that can get caught in machinery. Any loose clothing or long hair should be suitably restrained.

The School of Engineering issues a document to all students outlining its OH&S policy for the School’s Laboratories and Workshops. It is a requirement that all students must have read this document prior to entering any of the School’s workshops or laboratories.
“Students and staff working in the Civil & Mechanical Engineering laboratories are required to conform to the following dress requirements:

Protective footwear conforming with AS2210 having protective toe caps, full length trousers, tight fitting protective long sleeve jacket or coat, no loose clothing or hair. “

KNE351 Laboratory Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Day</th>
<th>Cylinder^</th>
<th>Turbo**</th>
<th>Open Channel*</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1/08/2012</td>
<td>Wednesday</td>
<td>9 am - 12 pm</td>
<td>ABC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wednesday</td>
<td>2 pm - 5 pm</td>
<td>MNO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>8/08/2012</td>
<td>Wednesday</td>
<td>9 am - 12 pm</td>
<td>DEF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wednesday</td>
<td>2 pm - 5 pm</td>
<td>JKL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>15/08/2012</td>
<td>Wednesday</td>
<td>9 am - 12 pm</td>
<td>GHI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wednesday</td>
<td>2 pm - 5 pm</td>
<td>PQR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>22/08/2012</td>
<td>Wednesday</td>
<td>9 am - 12 pm</td>
<td>ABC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wednesday</td>
<td>2 pm - 5 pm</td>
<td>MNO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>29/08/2012</td>
<td>Wednesday</td>
<td>9 am - 12 pm</td>
<td>DEF</td>
<td></td>
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<tr>
<td></td>
<td>Wednesday</td>
<td>2 pm - 5 pm</td>
<td>JKL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>12/09/2012</td>
<td>Wednesday</td>
<td>9 am - 12 pm</td>
<td>GHI</td>
<td></td>
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<tr>
<td></td>
<td>Wednesday</td>
<td>2 pm - 5 pm</td>
<td>PQR</td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>19/09/2012</td>
<td>Wednesday</td>
<td>9 am - 12 pm</td>
<td>ABC</td>
<td></td>
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<tr>
<td></td>
<td>Wednesday</td>
<td>2 pm - 5 pm</td>
<td>MNO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>26/09/2012</td>
<td>Wednesday</td>
<td>9 am - 12 pm</td>
<td>DEF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wednesday</td>
<td>2 pm - 5 pm</td>
<td>JKL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>3/10/2012</td>
<td>Wednesday</td>
<td>9 am - 12 pm</td>
<td>GHI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wednesday</td>
<td>2 pm - 5 pm</td>
<td>PQR</td>
<td></td>
<td></td>
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</tbody>
</table>

Notes:
Aerodynamics Laboratory^ and Hydraulics Laboratory *
Groups ABCDEFGHI are morning sessions
Groups JKLMNOPQR are afternoon sessions

Specific attendance/performance requirements*
The Faculty of Science, Engineering and Technology states that all students must attend a minimum of 2/3rds of all lectures and tutorials. This policy may be viewed at http://fcms.its.utas.edu.au/files/policies/Faculty%20Assessment%20Guidelines%20Nov%202004.pdf Attendance and completion of all laboratory work is mandatory.

To pass this unit a final aggregate mark of at least 50% must be achieved in addition to meeting the following requirements:
- A minimum mark of 45% on internal assessment component (mid-semester tests and laboratory reports);
- A minimum mark of 45% on the final exam;
- Attendance at all laboratory sessions and submission of all laboratory reports; and
- A minimum mark of 45% in the final examination
### Assessment

#### Assessment schedule

<table>
<thead>
<tr>
<th>Assessment task</th>
<th>Date due</th>
<th>Percent weighting</th>
<th>Links to Intended Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Task 1: Laboratory Experiments and Reports (x3)</td>
<td>10 working days from the date of experiment</td>
<td>10% for each report (30% total).</td>
<td>1-4,6,7</td>
</tr>
<tr>
<td>Assessment Task 2: Mid-Semester Test</td>
<td>Week 8 during class lecture time</td>
<td>10%</td>
<td>1-4</td>
</tr>
<tr>
<td>Examination</td>
<td></td>
<td>60%</td>
<td></td>
</tr>
</tbody>
</table>

#### Assessment details

**Assessment task 1 – Laboratory Experiments and Reports (x3).**

**Task description**

Each of the three laboratory components includes a prelab exercise (individual), laboratory experiment (group) and final report (group).

**Task length**

No minimum or maximum length required.

**Links to unit’s intended learning outcomes**

1-4,6,7

1. Demonstrate and apply knowledge of fluid mechanics
2. Analyse and interpret data from the laboratory experiment using correct principles.
3. Communicate effectively in technical writing.

**Date due**

10 working days from the date of experiment.

**Final exam**

Three hours, closed book.

**Description / conditions**

The final exam is conducted by the University Registrar in the formal examination period. See the Current Students homepage (>Examinations and Results) on the University’s website.
Assessment task 2

*Task description*
Mid-Semester test

*Task length*
1 hour

*Links to unit’s learning outcomes*
1-4

*Assessment criteria*
Demonstrate understanding of fluid mechanics concepts, theory and applications.

*Date due*
Week 8

**How your final result is determined***
Your final result will be determined from the aggregate of the internal assessment results (laboratories and mid-semester test) with the results from the end of semester exam using the component weights shown in the Assessment Schedule.

**Submission of assignments***
Laboratory reports should be submitted to the KNE351 assignment box located adjacent to the School of Engineering Office. Laboratory reports must include a group cover sheet signed by all group members.

Prelab exercises are due at the beginning of a scheduled laboratory session and are individual work.

**Requests for extensions***
All requests for extensions should be submitted via email to Dr Henderson WELL BEFORE the due date of the assignment ([alan.henderson@utas.edu.au](mailto:alan.henderson@utas.edu.au)). Generally, foreseeable work commitments will not be grounds for an extension.

**Penalties***
Unless an extension has been granted in writing, a penalty of 20% of the maximum possible mark will be deducted for each working day the laboratory is overdue. Exclusion from the mid-semester test will only be granted on medical grounds. Late prelab exercises will not be accepted.

**Review of results and appeals***
It is expected that students will adhere to the following policy for review of any piece of continuous assessment.

1. Within 5 days of the release of the assessment result, the student should request an appointment with the Lecturer. The student should be prepared to discuss specifically which section of the marking criteria they are disputing and why they consider the mark is inappropriate.

2. Following this discussion, students may request a formal remark of the original submission (in accordance with Rule of Academic Assessment 111, clause 22.1). This remark will be undertaken, where practicable, by an alternative assessor.
Students may also request a review of the final result in a unit. The request and payment must be made within 10 days from the date of the result notification. Students are referred to Rule of Academic Assessment 111, clause 23 at http://www.utas.edu.au/university-council/university-governance/rules and http://www.studentcentre.utas.edu.au/examinations_and_results/results/result_review_results.htm.

**Academic referencing**

In your written work you will need to support your ideas by referring to scholarly literature, works of art and/or inventions. It is important that you understand how to correctly refer to the work of others and maintain academic integrity. Failure to appropriately acknowledge the ideas of others constitutes academic dishonesty (plagiarism), a matter considered by the University of Tasmania as a serious offence. The appropriate referencing style for this unit is: **APA**

For information on presentation of assignments, including referencing styles: http://utas.libguides.com/referencing

Please read the following statement on plagiarism. Should you require clarification please see your unit coordinator or lecturer.

**Academic misconduct**

*Academic misconduct* includes cheating, plagiarism, allowing another student to copy work for an assignment or an examination and any other conduct by which a student:

1. seeks to gain, for themselves or for any other person, any academic advantage or advancement to which they or that other person are not entitled; or
2. improperly disadvantages any other student.

Students engaging in any form of academic misconduct may be dealt with under the Ordinance of Student Discipline, and this can include imposition of penalties that range from a deduction/cancellation of marks to exclusion from a unit or the University. Details of penalties that can be imposed are available in Ordinance 9: Student Discipline – Part 3 Academic Misconduct, see http://www.utas.edu.au/__data/assets/pdf_file/0006/23991/ord91.pdf.

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**Plagiarism**

Plagiarism is a form of cheating. It is taking and using someone else’s thoughts, writings or inventions and representing them as your own; for example, using an author’s words without putting them in quotation marks and citing the source, using an author’s ideas without proper acknowledgment and citation, copying another student's work. If you have any doubts about how to refer to the work of others in your assignments, please consult your lecturer or tutor for relevant referencing guidelines, and the academic integrity resources on the web at: http://www.academicintegrity.utas.edu.au/ .

The intentional copying of someone else’s work as one’s own is a serious offence punishable by penalties that may range from a fine or deduction/cancellation of marks and, in the most serious of cases, to exclusion from a unit, a course or the University.

The University and any persons authorised by the University may submit your assessable works to a plagiarism checking service, to obtain a report on possible instances of plagiarism. Assessable works may also be included in a reference database. It is a condition of this arrangement that the original author’s permission is required before a work within the database can be viewed.

**Further information and assistance**

If you are experiencing difficulties with your studies or assignments, have personal or life-planning issues, disability or illness which may affect your course of study, you are advised to raise these with your lecturer in the first instance.

There is a range of University-wide support services available to you including Teaching & Learning, Student Services, International Services. Please refer to the [Current Students](http://www.utas.edu.au/plagiarism/) homepage at: [http://www.utas.edu.au/students/](http://www.utas.edu.au/students/)

Should you require assistance in accessing the Library visit their website for more information at [http://www.utas.edu.au/library/](http://www.utas.edu.au/library/)

**Unit schedule***

<table>
<thead>
<tr>
<th>Week</th>
<th>Date beginning</th>
<th>Topic</th>
<th>Readings / Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11-Jul</td>
<td>Introduction; Flow over bodies, lift and drag force.</td>
<td>Ch 11 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td>2</td>
<td>18-Jul</td>
<td>Boundary layers, separation, streamlining.</td>
<td>Ch 10 &amp; 11 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td>3</td>
<td>25-Jul</td>
<td>Boundary layers, separation and streamlining (ctd)</td>
<td>Ch 10 &amp; 11 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td>4</td>
<td>1-Aug</td>
<td>Pipe Flows and Pump Matching</td>
<td>Ch 8 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td>5</td>
<td>8-Aug</td>
<td>Turbomachinery</td>
<td>Ch 14 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td>6</td>
<td>15-Aug</td>
<td>Turbomachinery</td>
<td>Ch 14 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td>7</td>
<td>22-Aug</td>
<td>Open Channel Flow</td>
<td>Ch 13 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td></td>
<td>Mid-semester break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>5-Sep</td>
<td>Open Channel Flow</td>
<td>Ch 13 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td>9</td>
<td>12-Sep</td>
<td>Open Channel Flow</td>
<td>Ch 13 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td>10</td>
<td>19-Sep</td>
<td>Potential Flow</td>
<td>Chs 4/9/10 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td>11</td>
<td>26-Sep</td>
<td>Potential Flow</td>
<td>Ch 4/9/10 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td>12</td>
<td>3-Oct</td>
<td>Potential Flow</td>
<td>Ch 4/9/10 Cengel &amp; Cimbala</td>
</tr>
<tr>
<td>13</td>
<td>10-Oct</td>
<td>Revision</td>
<td></td>
</tr>
</tbody>
</table>

*The unit schedule above may alter to accommodate conflicts with other University duties.*