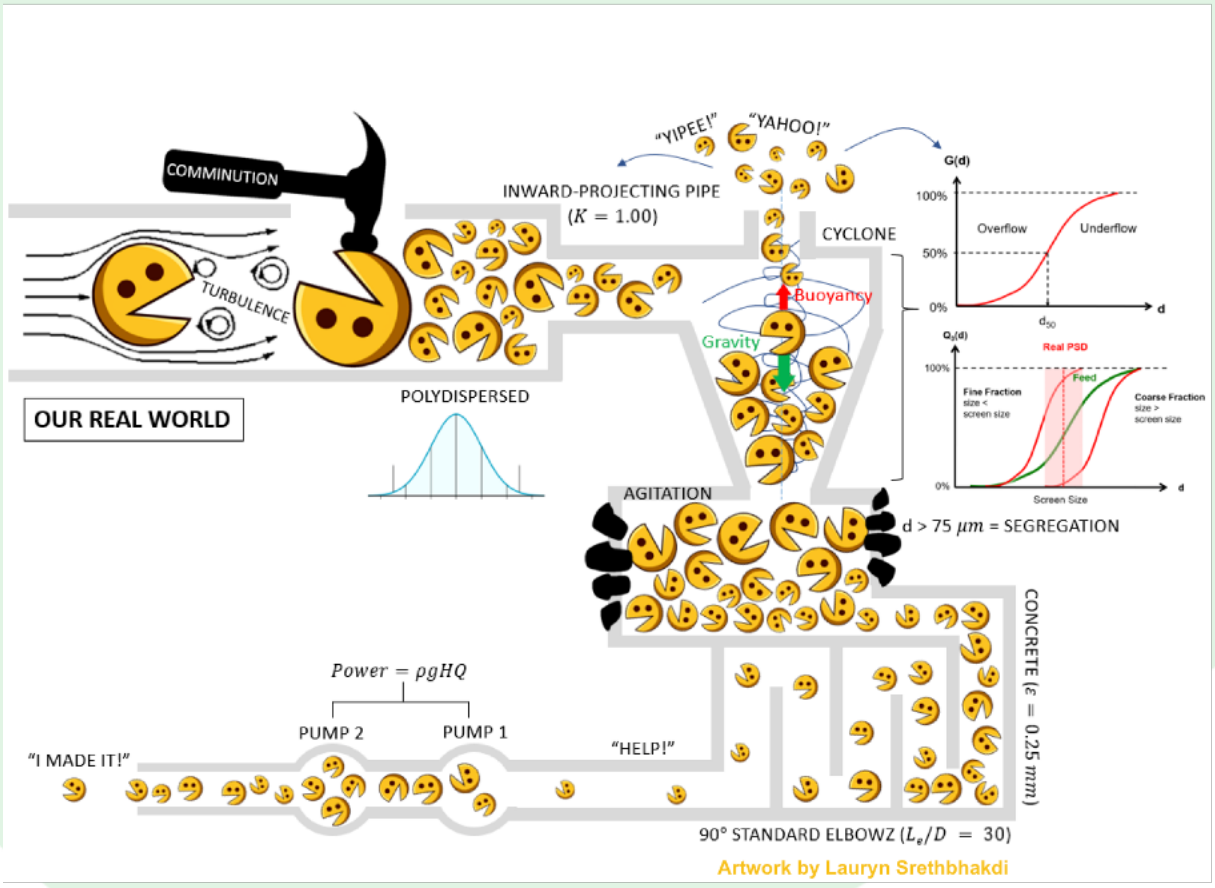
School of Chemical Engineering

UNSW Engineering

CEIC2001

Fluid and Particle Mechanics

Term 1, 2023



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
May Lim	m.lim@unsw.edu.au	Microsoft Teams	520 Hilmer Building (E10)	

Demonstrators

Name	Email	Availability	Location	Phone
Zhenhai Xia	zhenhai.xia@unsw.edu.au	Microsoft Teams		

School Contact Information

For assistance with enrolment, class registration, progression checks and other administrative matters, please see the Nucleus: Student Hub. They are located inside the Library – first right as you enter the main library entrance. You can also contact them via http://unsw.to/webforms or reserve a place in the face-to-face queue using the UniVerse app.

If circumstances outside your control impact on submitting assessments, Special Consideration may be granted, usually in the form of an extension or a supplementary assessment. Applications for Special Consideration must be submitted online.

For course administration matters, please contact the Course Coordinator.

Questions about the this course should normally be asked during the scheduled class so that everyone can benefit from the answer and discussion.

Course Details

Units of Credit 6

Summary of the Course

One of the roles of an engineer is to design processes where fluids or particulate materials are transported at scale. A Biomedical Engineer may design an artificial heart to pump blood around the human body. A Chemical Engineering treat and deliver water from a reservoir to every household in Sydney. Petroleum engineers design methods for extracting oil and gas from deposits below the earth's surface. A Food Technologist will mix a large amount of flour, sugar, and butter to make delicious biscuits. The engineer or technologist will need to know how fluid and particles behave to carry out these tasks efficiently and cost-effectively. This course teaches the science and technology related to the handling and processing of fluids and particulate materials at scale.

The course is structured as nine core modules: 1. Fundamental Concepts in Fluid Mechanics (including fluid properties and behaviours, and the rheology of fluids and semi-solid), 2. Fluid Statics, 3. Fluid Dynamics, 4. Fluid Handling (including flow in pipes, pump and pumping), 5. Fluid Modelling (including differential analysis of fluid motion, dimensional analysis and similitude), 6. Particle Size and Size Distribution, 7. Particle Process and Processing (including classification, mixing, segregation and communition), 8. Particle Settling, and 9. Packed Bed.

Course Aims

This course aims to teach fluid and particle mechanics to Chemical Engineering, Chemical Product Engineering, Food Science and Technology, Food Science and Nutrition, Biomedical Engineering and Petroleum Engineering students. The purpose is to develop the students' knowledge and conceptual understanding of fluid and particles properties and behaviours. At the end of the course, students will be able to describe the fundamental properties of fluid and particle systems, and the relationships between different fluids and particles properties; formulate and apply scientific models to predict fluid or particle system behaviours in engineering applications; and apply fluid and particle mechanics principles in an engineering context. The knowledge and skills developed in the course are core to what engineers do and are prerequisites for advanced courses in the degree program.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Quantitatively describe the fundamental properties of fluids and particulate materials.	PE1.1, PE3.4
2. Explain how mathematical and statistical models or methods (including scientific models, integral analysis, differential analysis, dimensional analysis method, probability distributions and population balance modelling) can be used to describe and predict the behaviour of fluid and particle systems, or the relationships between different fluids and particles properties.	PE1.2

Learning Outcome	EA Stage 1 Competencies
3. Apply fluid mechanics principles in an engineering context, including the design piping system, pump selection and pump sizing.	PE2.2
4. Apply particle mechanics principles in an engineering context, including the design and optimisation of particle processes such as mixing, segregation, comminution, granulation, classification, settling, filtration, and fluidisation.	PE2.2

This course is part of UNSW Food Science specialisations approved (2021-2026) by the Institute of Food Technologists Higher Education Review Board (IFT HERB).

Teaching Strategies

The course is structured as nine core modules taught in four sequenced blocks of lectures, in-class and online learning activities, and assessment tasks. The course is delivered through a combination of lectures and workshops each week. Lectures are either pre-recorded or recorded live and are made available online. Workshops are delivered from campus with students encouraged to join in person.

The lectures are designed to give you an understanding of core concepts in fluid and particle mechanics. Course learning outcomes, prior learning, new knowledge, as well as the connections and transitions between the modules are made explicit to you. Examples, schematics, animations and videos in the lectures demonstrate and visualise the key concepts taught. Worked examples will give you an opportunity to familiarise yourself with the types of problems encountered in engineering practice and how the Wales-Woods model is used to solve these problems. Exercises with step-by-step guides scaffold learning and reduce cognitive load. The guides allow you to focus on understanding the solution heuristic, evaluate the merits of different solution methods, and verify the validity of the solutions and solution pathways.

You can attempt the exercises individually or with other students in peer learning activities during the lectorial and online. These activities, including group discussions, collaborative problem-solving and peer marking, will expose you to diverse others and develop their communication, collaboration and evaluative judgement abilities, in preparation for real-life social and employment situations. You can also elaborate on knowledge and concepts taught through various online interactions with the instructor, other students and invited speakers. These interactions are multi-media and may include retrieval practice, online discussions, and co-creation of learning artefacts such as concept maps. These activities reinforce and consolidate your learning by providing opportunities to retrieve, apply, test or demonstrate their knowledge over a spaced period of time.

Formative assessments, including take-home assignments, online quizzes and mock quizzes, are used to monitor your understanding and provide feedback on your ability to apply your knowledge and articulate how the knowledge or solution is applied. Summative assessments in the form of a written tests and examination determine and quantify your achievement by assigning marks and grades.

Additional Course Information

Time Commitment

UNSW expects students to spend approximately 150 hours to successfully complete a 6 UOC course like CEIC2001. Of the 150 hours, 70 hours will be spent participating in face-to-face classes, 10 hours in completing examinations, with the remaining 70 hours provided for private study, including revising the lecture notes, completing the worksheet worksheets and preparing for examination. Therefore, outside the lectures and workshops, you should be spending at least 7 hours per week on this course.

A student who has a deficit in study and time management skills would be required to seek assistance from UNSW Student Support and Success. A student who has ongoing personal or health issue that is interfering their course work and attendance should register with UNSW Equitable Learning Services and discuss their study needs with the course convener prior to or at the commencement of the course.

The census date for this course is 11:59 PM 12 March 2023. The census date is the last day you can withdraw from a course without financial penalty. There may be circumstances where the student will be advised to withdraw from the study, seek program leave or program discontinuation after the census date. See fee remission, financial and academic penalty for further information.

Competency

Students are expected to enter CEIC2001 having developed competencies in all the material covered in the pre-requisite PHYS1121 or PHY1131 or DPST1021 or DPST1023 and MATH1231 or MATH1241 or MATH1251 or DPST1014 courses.

Participation

Participation in learning activities in the lectures and lectorials (face-to-face or online) are not mandatory in this course. However, watching the lecture in the week it was recorded, taking notes, asking questions, completing formative assessment tasks (take-home assignment, mock quizzes) and engaging in group learning activities have been shown to lead to better academic attainment and wellbeing in this course. UNSW expects university commitments such lecture, workshop and examination (including supplementary examination) will take precedence over work activities, sports, holidays etc. There is currently no provision for personal instruction by the lecturer or demonstrators of this course.

Assessment

Assessment Implementation

Summative assessments in the form of four written examinations are used to determine and quantify the students' achievement by assigning marks and grades. The first three examinations, worth 10%, 20% and 30% of the total course mark respectively, will be held online at the date and time shown in the Assessment task section. The final examination, worth 40% of the course mark, will be held during the exam period at a time that will be announced on myUNSW.

The examination script can be downloaded from Moodle on the day of the examination. All submissions must be made as a single PDF file that is less than 200 MB in size. Instructions on how to convert handwritten documents to a single PDF file can be found here.

Students should start their submission process at 4:30 PM AEST and have until 5:00 PM AEST to notify the course convenor of any issues with the submission process. Late submissions will not be accepted.

Examination scripts will be peer-reviewed, marked and returned approximately 10 days after the examination via Moodle. Students can check and appeal their marks using the submission links in Moodle before the due date and time indicated in Moodle.

If you were granted Special Consideration, your supplementary examinations will be held at a to-be-confirmed date, time and venue between 15 May 2023 and 26 May 2023.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Examination EM01 Submission	8%	28/02/2023 05:00 PM	1, 2
2. Examination EM01 Peer Assessment and Feedback	2%	07/03/2023 05:00 PM	1, 2
3. Examination EM02 Submission	16%	14/03/2023 05:00 PM	1, 2, 3
4. Examination EM02 Peer Assessment and Feedback	4%	28/03/2023 05:00 PM	1, 2, 3
5. Examination EM03 Submission	24%	11/04/2023 05:00 PM	1, 2, 3
6. Examination EM03 Peer Assessment and Feedback	6%	18/04/2023 05:00 PM	1, 2, 3
7. Examination EM04 Submission	40%	Exam Period	1, 2, 4

Assessment 1: Examination EM01 Submission

Start date: 28/02/2023 02:30 PM
Assessment length: 2.5 hours (2 hours examination + 0.5 hour for submission)
Submission notes: Moodle submission
Due date: 28/02/2023 05:00 PM
Marks returned: 10/03/2023

Examination EM01 Submission will cover the following topics:

- LM01A • Fundamental Concepts in Fluid Mechanics - Part A Fluid Properties and Behaviours
- LM01B • Fundamental Concepts in Fluid Mechanics - Part B Rheology of Fluids and Semi-Solids

The assessment will consist of a 2-hour test which will contribute to 8 marks for this task. You may find the rheology exam to be an interesting assessment because it tests your understanding of the behaviour of fluids under different conditions. This is a critical concept in chemical engineering, as it allows you to predict how materials will behave in various processes and make informed design decisions. Additionally, a strong understanding of rheology can be useful in your future studies and career, as it is relevant to a range of industries including food, pharmaceuticals, and materials processing.

Assessment 2: Examination EM01 Peer Assessment and Feedback

Start date: 01/03/2023 05:00 PM
Submission notes: Moodle submission
Due date: 07/03/2023 05:00 PM
Marks returned: 10/03/2023

The assessment will consist of a peer assessment and feedback of Examination EM01, all of which will contribute 2 marks for this task.

Assessment 3: Examination EM02 Submission

Start date: 14/03/2023 02:30 PM
Assessment length: 2.5 hours (2 hours examination + 0.5 hour for submission)
Submission notes: Moodle submission
Due date: 14/03/2023 05:00 PM
Marks returned: 31/03/2023

Assessment 2 will cover the following topics:

- LM02 • Fluid Statics
- LM03 • Fluid Dynamics

The assessment will consist of a 2-hour test which will contribute to 16 marks for this task. You may find the exam on fluid statics and dynamics to be an interesting assessment because it tests your understanding of fundamental principles of fluid mechanics. This is a crucial topic in chemical engineering, as it is relevant to many applications including fluid flow in pipes, heat transfer in reactors, and the design of separation processes. Furthermore, a strong grasp of fluid statics and dynamics can be beneficial to your future studies and career, as it is applicable to a wide range of industries including oil and gas, environmental engineering, and biotechnology.

Assessment 4: Examination EM02 Peer Assessment and Feedback

Start date: 15/03/2023 05:00 PM
Submission notes: Moodle submission
Due date: 28/03/2023 05:00 PM
Marks returned: 31/03/2023

The assessment will consist of a peer assessment and feedback for Examination EM02, all of which will contribute 4 marks for this task.

Assessment 5: Examination EM03 Submission

Start date: 11/04/2023 02:30 PM
Assessment length: 2.5 hours (2 hours examination + 0.5 hour for submission)
Submission notes: Moodle submission
Due date: 11/04/2023 05:00 PM
Marks returned: 21/04/2023

Assessment 3 will cover the following topics:

- LM04A Fluid Handling - Part A Flow in Pipes
- LM04B Fluid Handling - Part B Pump and Pumping
- LM05A Fluid Modelling - Part A Dimensional Analysis and Similitude
- LM05B Fluid Modelling - Part B Differential Analysis of Fluid Flow

The assessment will consist of a test which will contribute 24 marks for this task. You may find the exam on pumps, dimensional analysis, and differential analysis to be an interesting assessment because it challenges your understanding of key concepts in chemical engineering. The exam covers topics such as pump design and performance, dimensional analysis for scaling and modelling, and differential analysis for solving complex systems. These skills are essential for a chemical engineer, as they are used in various areas including process design, energy conservation, and chemical reaction engineering. Additionally, a strong understanding of these concepts can be useful in your future studies and career, as they are applicable to a wide range of industries including mining, petrochemical, metallurgy, pharmaceutical, and biotechnology.

Assessment 6: Examination EM03 Peer Assessment and Feedback

Start date: 12/04/2023 05:00 PM
Submission notes: Moodle submission
Due date: 18/04/2023 05:00 PM
Marks returned: 21/04/2023

The assessment will consist of a peer assessment and feedback for Examination EM03, all of which will contribute 6 marks for this task.

Assessment 7: Examination EM04 Submission

Start date: Exam Period
Assessment length: 2.5 hours (2 hours examination + 0.5 hour for submission)
Submission notes: In person using the Inspera platform
Due date: Exam Period
Marks returned: 18/05/2023

The final examination will cover the following topics:

- LM06 • Particle Size and Size Distribution
- LM07A • Particle Process and Processing - Part A Classification
- LM07B • Particle Process and Processing - Part B Mixing and Segregation
- LM07C • Particle Process and Processing - Part C Comminution
- LM08 • Particle Settling - Single Particle
- LM09A • Particle Bed - Part A Fundamentals of Packed Bed
- LM09B • Particle Bed - Part B Fluidization

The assessment will consist of a 2-hour test which will contribute to 40 marks for this task. You may find the exam on particle mechanics to be an interesting assessment because it tests your knowledge of the characteristic and behaviour of particles. This is a crucial topic in chemical engineering, as it is relevant to many applications including particle size analysis, sedimentation, fluidisation and filtration. Additionally, a strong understanding of particle mechanics can be beneficial to your future studies and career, as it is applicable to a wide range of industries including mining, environmental engineering, and biotechnology.

Assessment criteria

CRITERIA	FL (0%)	PS-CR (60%)	DN (80%)	HD (100%)
Calculation	The calculation procedure is incorrect due to major misconception or absent AND no explanation is provided AND where required the reference for fluid properties was not provided AND units are not provided.	Calculation and final answer are both correct BUT explanation/justification is missing/incorrect/irrelevant/ incomprehensible/convoluted OR where required the reference for fluid properties was not provided OR units are not provided.	Calculation procedure is correct but final answer is incorrect due to a minor miscalculation AND explanation/justification is correct AND where required reference for fluid properties was provided AND units are provided.	Calculation and final answer are both correct AND explanation/justification is correct AND where required reference for fluid properties was provided AND units are provided.
Explanation	Explanation or justification is missing/incorrect/incomprehensible/convoluted.	Explanation or justification is mostly correct BUT missing more than one key element.	Explanation or justification is mostly correct BUT missing one key element.	Explanation or justification is correct and no element is missing.

CRITERIA	FL (0%)	PS-CR (60%)	DN (80%)	HD (100%)
Sketch/Plot	The sketch or plot is missing/incorrect/incomprehensible.	The sketch or plot is mostly correct BUT missing more than one key element.	The sketch or plot is mostly correct BUT missing one key element.	The sketch or plot is correct and no element is missing.
Quantitative Assessment	No quantitative assessment was provided or the quantitative assessment is inaccurate for all assigned submissions.	Quantitative assessment is accurate for 1 out of 3 assigned submissions.	Quantitative assessment is accurate for 2 out of 3 assigned submissions.	Quantitative assessment is accurate for all assigned submissions.
Qualitative Assessment	No evidence of qualitative assessment or the assessor has incorrectly described where or how errors occurred, and/or how it affects the solution AND there is no actionable feedback or only superficial feedback (e.g. Great work!) provided.	The assessor correctly describes where or how calculation or conceptual errors occurred, and how it affects the solution, in the feedback section of Moodle Workshop BUT there is no actionable feedback or only superficial feedback (e.g. Great work!) provided.	The assessor correctly describes where or how some calculation or conceptual errors occurred, and how it affects the solution, in the feedback section of Moodle Workshop AND there is some actionable feedback.	The assessor correctly describes where or how all calculation or conceptual errors occurred, and how it affects the solution, in the feedback section of Moodle Workshop AND there is clear and comprehensive actionable feedback. You are convinced the assessor is competent.

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Schedule

View class timetable

Timetable

Date	Type	Content
Week 1: 13 February - 17 February	Lecture	LM00 • Course Orientation (1H00M) Course Orientation Introduction to Fluid Mechanics LM01A • Fundamental Concepts in Fluid Mechanics - Part A Fluid Properties and Physical Quantities (3H00M) Characteristics of Matter Fluid Properties and Physical Quantities - Mass and Weight Properties - Force, Stress and Pressure - Velocity and Velocity Gradient - Viscosity - Surface Tension LM01B • Fundamental Concepts in Fluid Mechanics - Part B Rheology of Fluids and Semi-Solids (1H00M) Rheology of Fluids and Semi-Solids - Time Independent • Show Yield Stress - Time Independent • No Yield Stress - Time Dependent Steady-State Rheological Model of Herschel-Buckley LM02 • Fluid Statics (2H00M) Static Pressure Variation at a Point Static Pressure Variation from Point to Point Hydrostatic Force on Submerged Surface - Part 1 Formula Method Hydrostatic Force on Submerged Surface - Part 2 Integration Method
	Workshop	TM01B • Fundamental Concepts in Fluid Mechanics - Part B Rheology of Fluids and Semi-Solids (1H00m)
Week 2: 20 February - 24 February	Lecture	LM02 • Fluid Statics (2H00M) Hydrostatic Force on Submerged Surface - Part 3

		Geometrical Method Hydrostatic Force on Submerged Surface - Part 4 Projection Method Buoyancy, Flotation and Stability Pressure Measurement Absolute Pressure and Gauge Pressure LM03 • Fluid Dynamics (2H00M) Eulerian Specification of the Flow Field Continuity Equation Momentum Equation Bernoulli's Equation Angular Momentum
	Workshop	TM02-1 • Fluid Statics (2H00M) TM02-2 • Fluid Statics (2H00M)
Week 3: 27 February - 3 March	Lecture	LM04A • Fluid Handling - Part A Flow in Pipes (2H00M) Relative Roughness of a Pipe Reynolds Number Friction Losses Minor Losses
	Workshop	TM03 • Fluid Dynamics (2H00M)
	Assessment	Examination EM01 Submission: Moodle submission
Week 4: 6 March - 10 March	Lecture	LM04A • Fluid Handling - Part A Flow in Pipes (2H00M) Relative Roughness of a Pipe Reynolds Number Friction Losses Minor Losses LM04B • Fluid Handling - Part B Pump and Pumping (4H00M) Pump Classification Hydraulic Head, Suction Head, Discharge Head and Total Dynamic Head Pump Performance Curve - Single Pump Pump Performance Curve - Multiple Pumps System Resistance Cavitation Specific Speed
	Workshop	TM04A • Fluid Handling - Part A Flow in Pipes (2H00M)
	Assessment	Examination EM01 Peer Assessment and Feedback: Moodle submission

Week 5: 13 March - 17 March	Workshop	TM04B-1 • Fluid Handling - Part B Pump and Pumping (2H00M) TM04B-2 • Fluid Handling - Part B Pump and Pumping (2H00M)
	Assessment	Examination EM02 Submission: Moodle submission
Week 7: 27 March - 31 March	Lecture	LM05A • Fluid Modelling - Part A Partial Differential Analysis of Fluid Flow (2H00M) Control Volume and Control Surfaces Conservation of Mass - Continuity Equation Conservation of Momentum - Part 1 General Form - Part 2 Navier-Stokes Equations Cylindrical and Spherical Coordinate LM05B • Fluid Modelling - Part B Dimensional Analysis and Similitude (2H00M) Dimensionless Groups Buckingham π Theorem Dimensionless Group from Indicial Method Dimensionless Group from Group Method
	Workshop	TM05A • Fluid Modelling - Part A Partial Differential Analysis of Fluid Flow (2H00M) TM05B • Fluid Modelling - Part B Dimensional Analysis and Similitude (2H00M)
	Assessment	Examination EM02 Peer Assessment and Feedback: Moodle submission
Week 8: 3 April - 7 April	Lecture	LM06 • Particle Size and Size Distribution (2H00M) Particle Size Size of Single Particles Size Distribution of Multiple Particles Particle Surface, Mass and Volume Distributions from Number Distribution Mode, Median and Mean of a Distribution LM07A • Particle Process and Processing - Part A Classification (1H00M) Industrial Scale Sizing and Classification Classification with Cyclone and Hydrocyclone Mass Balance in Cyclones and Hydrocyclones Separation Efficiency and Grade Efficiency Cyclone and Hydrocyclone Configuration LM07B • Particle Process and Processing - Part B Mixing and Segregation (1H00M) Particle Segregation

		Quality of Mixture
	Workshop	TM06 • Particle Size and Size Distribution (2H00M) TM07A • Particle Process and Processing - Part A Classification (2H00M)
Week 9: 10 April - 14 April	Lecture	LM07C • Particle Process and Processing - Part C Comminution (2H00M) Introduction to Comminution Energy Requirement for Communition Change in Size Distribution After Communition
	Workshop	TM07C • Particle Process and Processing - Part C Comminution (2H00M)
	Assessment	Examination EM03 Submission: Moodle submission
Week 10: 17 April - 21 April	Lecture	LM08 • Particle Settling - Single Particle (2H00M) Single Particle Settling LM09A • Particle Bed - Part A Fundamentals of Packed Bed (1H00M) Packed Bed LM09B • Particle Bed - Part B Fluidization (1H00M) Fluidization
	Workshop	TM08 • Particle Settling - Part A Single Particle (2H00M) TM09 • Particle Bed (2H00M)
	Assessment	Examination EM03 Peer Assessment and Feedback: Moodle submission

Resources

Prescribed Resources

Lecture slides, lecture recordings, workshop worksheets, discussion forums and links to Microsoft Team and Microsoft Stream sites will be available from Week 0 of Term 1 from the course's Moodle site.

Course reading list will be available from Week 0 of Term 1 from the course's Leganto site. Additional resources are available from the UNSW Library.

Recommended Resources

Textbooks

Engineering Fluid Mechanics, by D. F. Elger, B. A. LeBret, C. T. Crowe, J. A. Roberson, Wiley.
Fluid Mechanics in SI Units, by R. C. Hibbeler, Pearson.
Introduction to Particle Technology, by M. Rhodes, Wiley.

Supplementary Texts

Schaum's Outline of Fluid Mechanics, M. C. Potter, D. C. Wiggert, McGraw Hill.
Schaum's Outline of Fluid Mechanics and Hydraulics, Liu, Cheng ; Ranald, Giles ; Evett, Jack, McGraw Hill
Applied Fluid Mechanics for Engineers, M. T. Schobeiri, McGraw Hill.
Solution of Problems in Fluid Mechanics: A Problem-Based Textbook, J. F. Douglas, Pitman.

Handbooks

Perry Chemical Engineering Handbook, by D. W. Green, M. Z. Southard, R. H. Perry, McGraw-Hill.
Chemical Properties Handbook, by C. L. Yaws, McGraw Hill.
The Properties of Gases and Liquids, by B. E. Poling, J. M. Prausnitz, J. P. O'Connell, McGraw Hill.
Lange's Handbook of Chemistry, by J. G. Speight, McGraw Hill.
Fluid Flow Handbook, by J. M. Saleh, McGraw Hill.
Piping Handbook, by M. L. Nayyar, McGraw Hill.
Valve Handbook, by P. L. Skousen, McGraw Hill.
Pump Handbook, by I. J. Karassik, J. P. Messina, P. Cooper, C. C. Heald, McGraw Hill.
Pump Users Handbook, by R. Rayner, Elsevier Advanced Technology.
Sulzer Centrifugal Pump Handbook, by Sulzer Pump, Butterworth-Heinemann.

Handbook of Civil Engineering Calculations, by T. G. Hicks, McGraw Hill.
Handbook of Mechanical Engineering Calculations, by T. G. Hicks, McGraw Hill.
Marks' Standard Handbook for Mechanical Engineers, by A. M. Sadegh, W. M. Worek, McGraw Hill.

Course Evaluation and Development

Course Evaluation

Formal feedback will be gathered at the end of term using myExperience survey. Informal feedback will be gathered throughout the terms using Moodle Feedback activity.

Course Development

2022 • PVC Education and Student Experience hybrid delivery pilot.
2021 • Change in assessment question types.
2020 • Large Cohort Active Learning Initiative pilot with UNSW PVC Education.
2020 • Student support in the form of virtual study room in Microsoft Team.
2020 • Development of students' evaluative judgement skill in formative and summative assessment.
2019 • Use of Padlet to share learning artifacts and provide feedback in active learning.
2019 • Use of metacognitive wrapper to develop students' ability to self-monitor and self-evaluate.
2018 • $10,000 to Develop Adaptive Paper Tutor for UNSW3+.
2017 • Sewer Vent Shaft Design Work Integrated Learning micro-project with SVSR.
2016 • $30,000 for the Digital Uplift of CEIC2001, CVEN2501 and MMAN2600.
2016 • $8000 to develop Moodle Question Bank for CEIC2001 Fluid and Particle Mechanics.

Submission of Assessment Tasks

In the School of Chemical Engineering, all written work will be submitted for assessment via Moodle unless otherwise specified. Attaching cover sheets to uploaded work is not required unless specifically requested for an individual assessment task; when you submit work through Moodle for assessment you are agreeing to uphold the Student Code.

Some assessments will require you to complete the work online and it may be difficult for the course coordinator to intervene in the system after the due date. You should ensure that you are familiar with assessment systems well before the due date. If you do this, you will have time to get assistance before the assessment closes.

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect. Please make it easy for the markers who are looking at your work to see your achievement and give you due credit.

Marking guidelines for assignment submissions will be provided at the same time as assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

Late penalties

Unless otherwise specified, submissions received after the due date and time will be penalised at a rate of 5% per day or part thereof (including weekends) and will not be accepted more than 5 days late. For some activities including Exams, Quizzes, Peer Feedback, and Team Evaluation surveys, extensions and late submissions are not possible.

Special consideration

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to submitting an assessment or sitting an exam.

UNSW has a Fit to Sit / Submit rule, which means that if you attempt an exam or submit a piece of assessment, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

Please note that for **all** special consideration requests (including COVID-19-related requests), students will need documentary evidence to support absences from any classes or assessments.

Academic Honesty and Plagiarism

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage (International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013). At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and plagiarism can be located at:

- The Current Students site
- The ELISE training site

The Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct.

To help describe what we are looking for, here are some things that we consider to be quite acceptable (even desirable!) actions for many assessments, and some that we consider to be unacceptable in most circumstances. Please check with the instructions for your assessments and your course coordinator if you're unsure. As a rule of thumb, if you don't think you could look the lecturer in the eye and say "this is my own work", then it's not acceptable.

Acceptable actions	Unacceptable actions
✓ reading/searching through material we have given you, including lecture slides, course notes, sample problems, workshop problem solutions	✗ asking for help with an assessment from other students, friends, family
✓ reading/searching lecture transcripts	✗ asking for help on Q&A or homework help websites
✓ reading/searching resources that we have pointed you to as part of this course, including textbooks, journal articles, websites	✗ searching for answers to the specific assessment questions online or in shared documents
✓ reading/searching through your own notes for this course	✗ copying material from any source into your answers
✓ all of the above, for any previous courses	✗ using generative AI tools to complete or substantially complete an assessment for you
✓ using spell checkers, grammar checkers etc to improve the quality of your writing	✗ paying someone else to do the assessment for you
✓ studying course material with other students	

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism. Further information about referencing styles can be located at https://student.unsw.edu.au/referencing.

For assessments in the School of Chemical Engineering, we recommend the use of referencing software such as Mendeley or EndNote for managing references and citations. Unless required otherwise

specified (i.e. in the assignment instructions) students in the School of Chemical Engineering should use either the APA 7th edition, or the American Chemical Society (ACS) referencing style as canonical author-date and numbered styles respectively.

Artificial intelligence tools such as ChatGPT, CodePilot, and built-in tools within Word are modern tools that are useful in some circumstances. In your degree at UNSW, we're teaching you skills that are needed for your professional life, which will include how to use AI tools responsibly plus lots of things that AI tools cannot do for you. AI tools already are (or will soon be) part of professional practice for all of us. However, if we were only teaching you things that AI could do, your degree would be worthless, and you wouldn't have a job in 5 years.

Whether the use of AI tools in an assessment is appropriate will depend on the goals of that assessment. As ever, you should discuss this with your lecturers – there will certainly be assessments where the use of AI tools is encouraged, as well as others where it would interfere with your learning and place you at a disadvantage later. Our goal is to help you learn how to ethically and professionally use the tools available to you. To learn more about the use of AI, see this discussion we have written where we analyse the strengths and weaknesses of generative AI tools and discuss when it is professionally and ethically appropriate to use them.

While AI may might provide useful tools to help with some assessments, UNSW's policy is quite clear that taking the output of generative AI and submitting it as your own work will never be appropriate, just as paying someone else to complete an assessment for you is serious misconduct.

Academic Information

To help you plan your degree, assistance is available from academic advisors in The Nucleus and also in the School of Chemical Engineering.

Additional support for students

- Current Student Gateway for information about key dates, access to services, and lots more information
- Engineering Student Life - Current Student Resources for information about everything from getting to campus to our first year guide
- Student Support and Success for our UNSW team dedicated to helping with university life, visas, wellbeing, and academic performance
- Academic Skills to brush up on some study skills, time management skills, get one-on-one support in developing good learning habits, or join workshops on skills development
- Student Wellbeing, Health and Safety for information on the UNSW health services, mental health support, and lots of other useful wellbeing resources
- Equitable Learning Services for assistance with long term conditions that impact on your studies
- IT Service Centre for everything to do with computing, including installing UNSW licensed software, access to computing systems, on-campus WIFI and off-campus VPNs

Course workload

Course workload is calculated using the Units-Of-Credit (UOC). The normal workload expectation for one UOC is approximately 25 hours per term. This includes class contact hours, private study, other learning activities, preparation and time spent on all assessable work.

Most coursework courses at UNSW are 6 UOC and involve an estimated 150 hours to complete, for both regular and intensive terms. Each course includes a prescribed number of hours per week (h/w) of scheduled face-to-face and/or online contact. Any additional time beyond the prescribed contact hours should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations. Most 6 UoC courses will involve approximately 10-12 hours per week of work on your part. If you're not sure what to do in these hours of independent study, the resources on the UNSW Academic Skills pages offer some suggestions including: making summaries of lectures, read/summarise sections from the textbook, attempt workshop problems, reattempting workshop problems with some hints from the solutions, looking for additional problems in the textbook.

Full-time enrolment at university means that it is a *full-time* occupation for you and so you would typically need to devote 35 hours per week to your studies to suceed. Full-time enrolment at university is definitely incompatible with full-time employment. Part-time/casual employment can certainly fit into your study schedule but you will have to carefully balance your study obligations with that work and decide how much time for leisure, family, and sleep you want left after fullfilling your commitments to study and work. Everyone only gets 168 hours per week; overloading yourself with both study commitments and work commitments leads to poor outcomes and dissatisfaction with both, overtiredness, mental health issues, and general poor quality of life.

On-campus class attendance

In 2023, most classes at UNSW are running in a face-to-face mode only. Attendance is expected as is

participation in the classes. As an evidence-driven engineer or scientist, you'll be interested to know that education research has shown students learn more effectively when they come to class, and less effectively from lecture catch-up recordings. If you have to miss a class due to illness, for example, we expect you to catch up in your time, and within the coming couple of days.

For most courses that are running in an "in person" mode:

- Lectures are normally recorded to provide an opportunity to review material after the lecture; lecture recordings are not a substitute for attending and engaging with the live class.
- Workshops/tutorials are not normally recorded as the activities that are run within those sessions normally cannot be captured by a recording. These activities may also include assessable activities in some or all weeks of the term.
- Laboratories are not recorded and require in-person attendance. Missing laboratory sessions may require you to do a make-up session later in the term; if you miss too many laboratory sessions, it may be necessary to seek a Permitted Withdrawal from the course and reattempt it next year, or end up with an Unsatisfactory Fail for the course.
- Assessments will often require in-person attendance in a timetabled class or a scheduled examination.

This course outline will have further details in the Course Schedule and Assessment sections.

Class numbers are capped in each class to ensure appropriate facilities are available, to maintain student:staff ratios, and to help maintain adequate ventilation in the spaces. Only students enrolled in each specific classes will be allowed in the room. Class rosters will be attached to corresponding rooms and circulated among lab demonstrators and tutors. No over-enrolment is allowed in face-to-face classes.

In certain classroom and laboratory situations where physical distancing cannot be maintained or the staff running the session believe that it will not be maintained, face masks will be designated by the course coordinator as **mandatory PPE** for students and staff. Students are required to bring and use their own face mask. Mask can be purchased from IGA Supermarket (Map B8, Lower Campus), campus pharmacy (Map F14, Middle Campus), the post office (Map F22, Upper Campus) and a vending machine in the foyer of the Biological Sciences Building (Map E26, Upper Campus).

Your health and the health of those in your class is critically important. You must stay at home if you have COVID-19 or have been advised to self-isolate by NSW health or government authorities.

Asking Questions

Asking questions is an important part of learning. Learning to ask good questions and building the confidence to do so in front of others is an important professional skill that you need to develop. The best place to ask questions is during the scheduled classes for this course, with the obvious exception being questions that are private in nature such as special consideration or equitable learning plans. Between classes, you might also think of questions — some of those you might save up for the next class (write them down!), and some of them you might ask in a Q&A channel on Teams or a Q&A forum on Moodle. Please understand that staff won't be able to answer questions on Teams/Moodle immediately but will endeavour to do so during their regular working hours (i.e. probably not at midnight!) and when they are next working on this particular course (i.e. it might be a day or two). Please respect that staff are juggling multiple work responsibilities (teaching more than one course, supervising research students, doing experiments, writing grants, …) and also need to have balance between work and the rest of their life.

Note: This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up to date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

Image Credit

Lauryn Srethbhakdi, 2020

Our Real World!

The artist merged fluid and particle mechanics concepts by presenting fluids and particles as Pac-men. In the artist's own word, "The work represents my understanding of many real-life practical concepts, one of which is our world is not ideal. We cannot truly deliver fluid or particles from point A to point B without interference from friction, drag, pressure losses and turbulence. We cannot truly form an ideal mixture. We cannot truly break something into equal-sized parts. But we can account for deviations from ideal scenario using statistical methods. As engineers, we overcome these limitations through the use of scientific and mathematical models. Because our world is complex and non-ideal, we must make assumptions and simplifications that lend to our ability to create such solutions."

About the Artist

Lauryn Srethbhakdi is a student of the course CEIC2001 Fluid and Particle Mechanics in Term 1 of 2020.

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	✓
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	
PE2.2 Fluent application of engineering techniques, tools and resources	✓
PE2.3 Application of systematic engineering synthesis and design processes	
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in professional and lay domains	
PE3.3 Creative, innovative and pro-active demeanour	
PE3.4 Professional use and management of information	✓
PE3.5 Orderly management of self, and professional conduct	
PE3.6 Effective team membership and team leadership	