



浙江大學

ENGG520
Engineering Analysis

ENGG520

Engineering Analysis

Instructor Contact Details

Lecturer-in-charge: Dr. Yong Chen

Email: wlwyxy_29@zju.edu.cn

Office location: Zhejiang University, Hangzhou, China

Consultation Time: Book appointment by sending email to: wlwyxy_29@zju.edu.cn

Teaching Times, Modes and Locations

Course Duration: 20 Dec 2026 to 8 Jan 2027

Modes: Face-to-face

Location: Zhejiang University

Academic Level

Undergraduate

Credit Points:

The course is worth 6 units of credit point.

Credit Hours

The number of credit hours of this course equals to the credits of a standard semester- long course.

Contact Hours

The course contains a total of 53 contact hours, which consists of orientation, lectures, seminars, quiz, discussion, research, case study, small tests, assignments, on-site field trip(s), in-class and after-class activities, revision, self-study, and final exam. Students will receive an official transcript which is issued by Zhejiang University when completing this course.

Enrolment Requirements

Eligibility requires enrollment in an overseas university as an undergraduate or postgraduate student, proficiency in English, and pre-approval from the student's home institution.

Course Description:

This course introduces the fundamental principles and computational techniques used in engineering analysis and mathematical modelling. Students develop the analytical skills required to formulate, analyze, and solve engineering problems arising in a range of disciplines, including mechanical, civil, and aerospace engineering. The course covers analytical and numerical methods for modelling heat transfer, vibration, stress analysis, and other engineering systems. Key topics include ordinary and partial differential equations, Fourier series and transforms, Laplace transforms, scaling analysis, and numerical solution techniques such as finite difference, finite element, and finite volume methods. Through practical engineering applications and computational exercises, students learn to interpret mathematical models, evaluate engineering performance, and apply appropriate analytical and numerical methods to support engineering design and decision-making.

Prerequisite:

Prior knowledge in fundamental engineering is required for taking this course. Learning Resources

- Kreyszig, Erwin. Advanced Engineering Mathematics. 10th ed., Wiley, 2011.
- Logan, Daryl L. A First Course in the Finite Element Method. 7th ed., Cengage Learning, 2022.

Learning Objectives

By the end of this course, you should be able to:

- Explain the fundamental principles of mathematical modelling and engineering analysis for problems involving heat transfer, structural mechanics, fluid flow, and vibration.
- Apply analytical and numerical methods, including Fourier series, Laplace transforms, and differential equation techniques, to solve engineering problems.
- Develop mathematical models and computational solutions for engineering systems using appropriate numerical methods, including finite difference, finite element, and finite volume approaches.
- Analyze engineering problems by interpreting modelling results, evaluating solution accuracy, and selecting appropriate analytical or computational techniques.

Course Delivery:

- Face-to-face Lecture mode includes lectures, seminars, quiz, discussion, research, case study, small tests, assignments, on-site field trip(s), in-class and after-class activities, revision, and final exam.

The following course will be taught in English. There will also be guest speakers and optional field trips available for students who would like to enhance their learning experience. All courses and other sessions will be run during weekdays.

Topics and Course Schedule:

WK	Topic	Activities
1	Introduction to Engineering Analysis, Mathematical Modelling, and Numerical Methods	Lecture; Tutorial
1	Differential Equations and Mathematical Models for Engineering Systems	Lecture; Tutorial
1	Partial Differential Equations and Heat Conduction Analysis	Lecture; Tutorial
1	Analytical Solutions Using Separation of Variables and Fourier Series	Lecture; Tutorial
1	Numerical Methods for Heat Transfer and Finite Difference Analysis	Lecture; Tutorial
2	Wave Equations, Vibration Analysis, and Stability Problems	Lecture; Tutorial
2	Laplace and Poisson Equations: Analytical and Numerical Approaches	Lecture; Tutorial
2	Fourier Transforms and Signal Analysis in Engineering Applications	Lecture; Tutorial
2	Quiz	Closed book
2	Laplace Transforms and Their Applications in Engineering Analysis	Lecture; Tutorial

3	Finite Difference and Finite Volume Methods	Lecture; Tutorial
3	Fundamentals of Finite Element Analysis	Lecture; Tutorial
3	Computational Modelling and Engineering Simulation	Lecture; Tutorial
3	Legal Liability of Auditor The Changing Landscape of Auditor Litigation	Lecture; Tutorial
3	Integrated Engineering Analysis: Case Studies and Model Validation	Lecture; Tutorial
3	Revision	Tutorial
3	Final exam	Closed book

Assessments:

Class participation	15%
Quiz	15%
Assignments	20%
Final exam	50%

Pass Requirement (Double Pass Rule)

To pass this course, students are required to achieve:

- an overall mark of 50% or above, and
- a pass mark (50% or above) in the Final Examination.

Students who achieve an overall mark of 50% or above but do not achieve a pass in the Final Examination will receive a fail grade for the course.

Grade Descriptors:

HD	High Distinction	85-100
D	Distinction	75-84
Cr	Credit	65-74
P	Pass	50-64
F	Fail	0-49

High Distinction 85-100

- Treatment of material evidences an advanced synthesis of ideas Demonstration of initiative, complex understanding, and analysis.
- Work is well-written and stylistically sophisticated, including appropriate referencing, clarity, and some creativity where appropriate.
- All criteria addressed to a high level.

Distinction 75-84

- Treatment of material evidences an advanced understanding of ideas Demonstration of initiative, complex understanding and analysis Work is well-written and stylistically strong.
- All criteria addressed strongly.

Credit 65-74

- Treatment of material displays a good understanding of ideas.
- Work is well-written and stylistically sound, with a minimum of syntactical errors.
- All criteria addressed clearly.

Pass 50-64

- Treatment of material indicates a satisfactory understanding of ideas Work is adequately written, with some syntactical errors.
- Most criteria addressed adequately.

Fail 0-49

- Treatment of ideas indicates an inadequate understanding of ideas Written style inappropriate to task, major problems with expression.
- Most criteria not clearly or adequately addressed.

Academic Integrity

Students are expected to uphold the university's academic honesty principles which are an integral part of the university's core values and principles. If a student fails to observe the acceptable standards of academic honesty, they could attract penalties and even disqualification from the course in more serious circumstances. Students are responsible for knowing and observing accepted principles of research, writing and any other task which they are required to complete.

Academic dishonesty or cheating includes acts of plagiarism, misrepresentation, fabrication, failure to reference materials used properly and forgery. These may include, but are not limited to: claiming the work of others as your own, deliberately applying false and inaccurate information, copying the work of others in part or whole, allowing others in the course to copy your work in part or whole, failing to appropriately acknowledge the work of other scholars/authors through acceptable referencing standards, purchasing papers or writing papers for other students and submitting the same paper twice for the same subject.

This Academic Integrity policy applies to all students of the Zhejiang University in all programs of study, including non-graduating students. It is to reinforce the University's

commitment to maintain integrity and honesty in all academic activities of the University community.

Policy

The foundation of good academic work is honesty. Maintaining academic integrity upholds the standards of the University. The responsibility for maintaining integrity in all the activities of the academic community lies with the students as well as the faculty and the University. Everyone in this community must work together to ensure that the values of truth, trust and justice are upheld.

Academic dishonesty affects the University's reputation and devalues the degrees offered. The University will impose serious penalties on students who are found to have violated this policy. The following penalties may be imposed:

- ✓ Expulsion
- ✓ Suspension
- ✓ Zero mark /fail grade
- ✓ Marking down
- ✓ Re-doing/re-submitting of assignments or reports, and
- ✓ Verbal or written warning.

