



浙江大學

**MATH505**

**Mathematics in the Real World**

## MATH505

### Mathematics in the Real World

#### Instructor Contact Details

Lecturer-in-charge: Jiangbo Wang

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Office location: Huajiachi Campus, Zhejiang University, Hangzhou, China

Consultation Time: Book appointment by sending email to: wlwyxy\_29@zju.edu.cn

#### Teaching Times, Modes and Locations

Course Duration: 11 Jan 2026 to 30 Jan 2026

Modes: Face-to-face

Location: Huajiachi Campus, Zhejiang University via face-to-face

#### 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 unit explores the power and relevance of mathematics across disciplines. Students begin by engaging in a group project on a mathematical topic of interest, developing skills in research, communication, teamwork, and project management. The course then shifts to interdisciplinary collaboration, where students apply mathematical thinking to real-world problems alongside peers from diverse academic backgrounds. Emphasis is placed on problem-solving, creativity, and communicating mathematical ideas effectively to both specialist and non-specialist audiences.

### Prerequisite:

N/A

### Learning Resources

- COMAP. (2020). For All Practical Purposes: Mathematical Literacy in Today's World (11th ed.). W. H. Freeman. ISBN: 9781319244425.

### Learning Objectives

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

- Apply mathematical modelling to real physiological problems by conceptualizing biological systems in quantitative terms and learning new mathematical tools as needed.
- Collaborate effectively across disciplines to understand experimental design and physiological research, and to evaluate models against real experimental data.
- Communicate and document interdisciplinary work clearly and effectively through written reports, oral presentations, and teamwork outputs.

### 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 mathematical thinking across disciplines                                | Lecture; Tutorial |
| 1  | Mathematical communication<br>Introduction to research and collaboration tools          | Lecture; Tutorial |
| 1  | Logic and reasoning; understanding mathematical foundations and real-world applications | Lecture; Tutorial |
| 1  | Number systems, modular arithmetic, and their uses in information and coding            | Lecture; Tutorial |
| 1  | Statistics, probability, and decision-making under uncertainty                          | Lecture; Tutorial |
| 1  | Networks and graph theory; modelling connections in social and physical systems         | Lecture; Tutorial |
| 2  | Geometry in art and architecture; exploring symmetry and visual mathematics             | Lecture; Tutorial |
| 2  | In-class Test                                                                           | Closed book       |
| 2  | Modelling change using calculus; applications in science and economics                  | Lecture; Tutorial |
| 2  | Collaborative modelling with physiology peers; translating real systems into math       | Lecture; Tutorial |
| 2  | Algorithms, optimization, and the ethics of mathematical modelling                      | Lecture; Tutorial |
| 3  | Mathematical evaluation and storytelling                                                | Lecture; Tutorial |
| 3  | Group presentations to a general audience; feedback and discussion                      | Lecture; Tutorial |
| 3  | Reflection on mathematics in society                                                    | Lecture; Tutorial |
| 3  | Final reporting and course conclusion                                                   | Lecture; Tutorial |
| 3  | Revision                                                                                | Tutorial          |
|    | Final exam                                                                              | Closed book       |

Assessments:

|                     |     |
|---------------------|-----|
| Class participation | 15% |
| In-class Test       | 15% |
| Assignments         | 20% |
| Final exam          | 50% |

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.